AUGUST 1940 Thirty-Five Cents Per Copy

# Coal Age

Volume 45 Number 8

**Assistant Secretary of War Johnson** answers some pertinent questions asked by Coal Age as to the specific effect of the national defense program on mining operations, p. 39. How selective service of man power, production procedure for supplies and equipment, and adequate transportation are to be coordinated makes planning easier in these hectic times . . . **How a small truck mine** increased output 265 per cent within three years, while financing itself from the used-machinery stage to modern-type equipment, will make interesting reading in an early Coal Age issue. Starting with an automobile engine in 1936, Moore Branch mine is now completely electrified and may hang up a record of 75,000 tons output this year, and that's how small mines grow into big ones. . . . **Making State parks** out of coal mines sounds funny, but it's true. Lakes stocked with fish were once open pits, and trees now cover the ugly spoil banks originally made by Indiana strippers. This well illustrated story, p. 36, tells it all, and actual forestation figures bolster

(CONTINUED ON PAGE 7)



## Contents



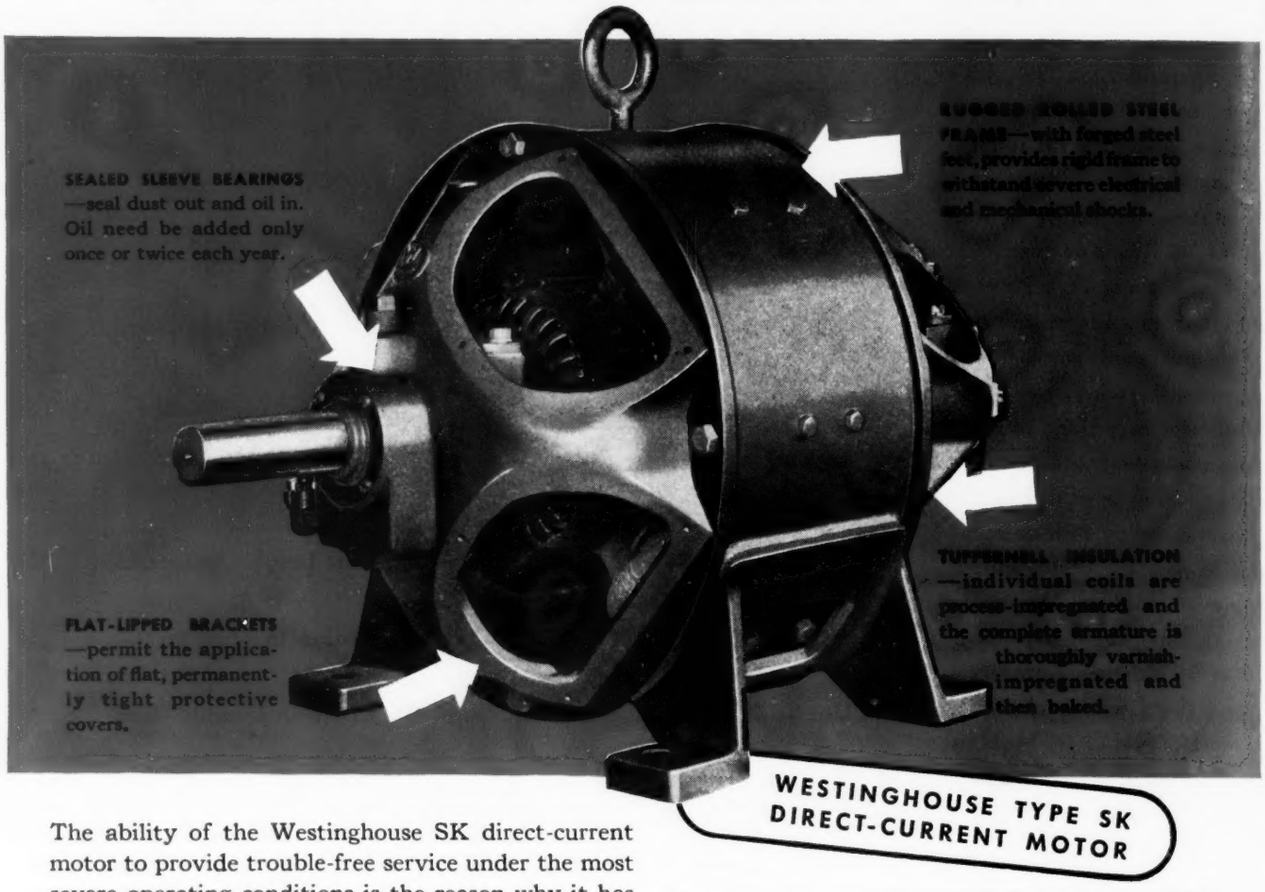


COAL AGE (with which is consolidated "The Colliery Engineer" and "Mines and Minerals") is published monthly on the 1st. Allow at least ten days for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 330 West 42nd Street, New York, N. Y.

Subscription rates: United States, Canada, Mexico, Central and South America, $3 for one year, $4 for two years, $5 for three years. Great Britain and British Possessions, 30 shillings for one year, 60 shillings for three years. All other countries, $5 for one year, $10 for three years. Single copies, 35 cents each. Entered as second-class matter Oct. 14, 1936, at the Post Office at Albany, N. Y. under the Act of March 3, 1879. Printed in the U. S. A. Cable address: "McGraw-Hill, N. Y." Member A.B.P. Member A.B.C.

# Built to "Stand the Gaff"

## OF HEAVY-DUTY MINING SERVICE




**WESTINGHOUSE TYPE SK DIRECT-CURRENT MOTOR**

The ability of the Westinghouse SK direct-current motor to provide trouble-free service under the most severe operating conditions is the reason why it has been the standard motor for underground service since 1911. Outstanding performance is the result of matching rugged mechanical construction with excellence of electrical design.

Its rugged rolled steel frame assures a uniform magnetic path and provides vastly improved commutation. Armature coils are insulated in the slot portions with mica. Field coils are wound on rigid, Micarta forms to assure permanent protection against "grounds." Tuffernell insulation gives long-time protection against moisture, mild acids and abrasive dust.

It will pay you to get all the facts on this motor built especially for mining service. Just call your nearest Westinghouse representative. J-21083

### How Standardization of "SK" Wearing Parts Cuts Cost of Replacement Parts

During 29 years of constant motor improvement Westinghouse has maintained the same essential dimensions on the wearing parts of the SK motor. Today, parts made for the latest improved design will fit every SK motor ever built. Thus, when you standardize on Type SK motors you automatically reduce and greatly simplify your requirements for replacement parts stocks. Parts for the latest SK design will fit every model you have in service.

**WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY • EAST PITTSBURGH, PA.**

**Westinghouse SK Mining Motors**

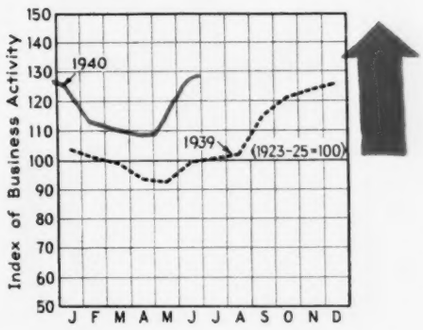
(CONTINUED FROM PAGE 5)

the facts. . . . **Power savings** of 2c. per ton is a healthy percentage of total power cost in any man's mine and any man's language. So many are the "sins of omission" in coal-mine electrification that an article featuring a broad rehabilitation program will come as an anointing of sweet oil and myrrh. Puritan mine, in Mingo County, has had such a fulfillment, as Coal Age will tell you soon. . . . **Battleships are one thing,** but gunboats are another, in the anthracite. Delivering all coal to the Weston breaker with two 20-ton gunboats, Packer No. 4 mine has solved its surface transportation problems. The story detailing the method employed in delivering 3,500 net tons per day starts on p. 44. . . . **It's a great big job** to study operating details of 17 companies running 30 mines in a highly modernized coal-producing section like southern Illinois, but—we've done it. Field work for Coal Age's 20th Annual Model Mining Number has been completed. The editors are busy unscrambling the mass of data to select all worth-while items for clear and concise presentation on all best practices. October is the time, Coal Age is the place. Don't miss it. . . . **Front cover space** this month was released for editorial use by Broderick & Bascom Rope Co., whose advertisement occupied that spot last August.

# HOW'S BUSINESS

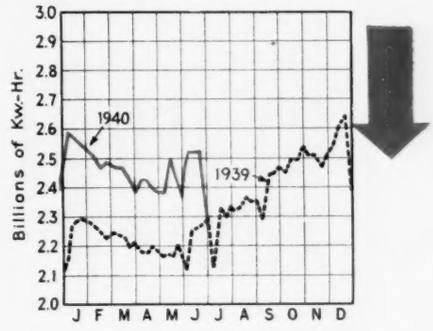
## GENERAL BUSINESS CONDITIONS

Though the *Business Week* Index of business activity has reached the highest level of the recent rise, the gain is more symbolic than significant, according to that publication. Business men are hestitant, awaiting more definite dope on the presidential campaign and progress of the German-Italian attack on Great Britain. During the week ended July 13 the Index reached 125.8, topping the 1939 peak by 0.1 point and falling short only 9.5 points of the all-time high of 1929.



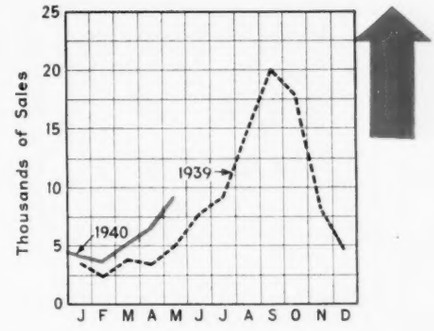

## ELECTRICAL POWER OUTPUT

Production of electric energy by the electric-light and power industry during the four weeks following our last report, according to the Edison Electric Institute, was: week ended June 15, 2,516,000,000 kw.-hr.; June 22, 2,509,000,000; June 29, 2,514,000,000; July 6, 2,264,953,000 kw.-hr. Independence Day observance caused a record drop in output, though production remained 9.0 per cent ahead of the corresponding week of last year.



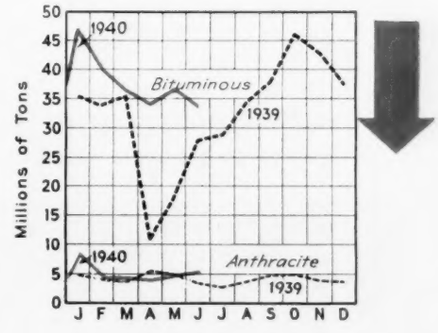

## COAL STOKER SALES

Mechanical stoker sales in the United States in May last totaled 8,415 units (U. S. Bureau of the Census from 107 manufacturers), compared with 6,330 in the preceding month and 5,293 in May, 1939. Sales of small units in May last were: Class 1 (under 61 lb. of coal per hour), 7,698 (bituminous, 6,995; anthracite, 703); Class 2 (61-100 lb. per hour), 331 (bituminous, 316; anthracite, 15); Class 3 (101-300 lb. per hour), 225.




## COAL PRODUCTION

Bituminous coal production by United States mines in June last (preliminary) totaled 32,640,000 net tons, according to the Bituminous Coal Division, U. S. Department of the Interior, which compares with 35,468,000 tons in the preceding month and 27,959,000 tons in June, 1939. Anthracite tonnage in June last was 4,366,000 (preliminary), according to the U. S. Bureau of Mines, against 3,957,000 (revised) in the preceding month and 3,577,000 tons in June, 1939.



# Save Costs 4 Ways

## BY USING THE RIGHT OIL... AT THE RIGHT PLACE... IN THE RIGHT WAY!

You'll find the Socony-Vacuum Man talks in your interest. He knows how to help you get lower maintenance costs... lower power costs... more continuous production... lower lubrication costs! And he does it by recommending the right type of lubricant for every kind of job... plus giving expert lubrication engineering service. In this way, for 74 years, our men have helped U. S. Industry earn a "lubrication profit." May we help you?

**SOCONY-VACUUM OIL CO., INC.** Standard Oil of New York Division...White Star Division...Lubrite Division...Chicago Division White Eagle Division...Wadhams Division...Magnolia Petroleum Company...General Petroleum Corporation of California

## Call Socony-Vacuum for

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

# Coal Age

Established 1911 — McGraw-Hill Publishing Co., Inc.
SYDNEY A. HALE, Editor • AUGUST, 1940

## Pertinent and Impertinent

• LATIN-AMERICAN credit conditions are affected by the war, but United States exporters, states a recent credit association survey, are generally maintaining sales terms. Just how much more coal could be moved southward if terms were revised to make prime credit risks of our Central and South American industrial neighbors?

• INDUSTRIAL ACCIDENTS cause the loss of 2,000 eyes every year. And industry foots an annual bill of approximately $37,000,000 for medical expenses and compensation. The greater part of this loss—both human and financial—could be avoided if more workers wore goggles. Not any kind of goggles, but the type best suited to the particular occupation. Only a short time ago, exploding babbitt metal splashed under a pair of spectacle-type glasses worn by a mine mechanic and burned both eyelids and parts of the cornea of one eye. While these glasses prevented a more serious injury and possibly total loss of sight, eye-cup goggles would have given complete protection.

• MORE THAN forty per cent of the wage earners in the manufacturing industries, and a lesser percentage in extractive enterprises, received vacations with pay in 1937. Since then the percentage has not diminished. Latest addition to the ranks is General Motors by virtue of its recent C.I.O. contract, in which government conciliators had a finger. Like it or not, the day is coming when the coal-mining industry, too, will have to come to grips with this movement.

• "COLD STEEL and motor gears," shouts a recent headline in the *United Mine Workers' Journal*, "put man power on the scrap heap." How much more reassuring—and factual—had it read: "Cold steel and motor gears raise manpower output to meet all emergencies."

• AMONG acid-breeding practices in mines, these five are most frequent: Blocking room mouths with road cleanings which hold back water; pumping from swag to swag; choosing old rooms, often full of pyritic gob and creviced pillars, for sumps; using large low-lying areas for the storage of water so as to get a few weeks of low-cost water disposal; pumping water into handy gobs. Better housekeeping would result in reduced acidity.

• DR. KARL COMPTON, president of Massachusetts Tech, is urging all companies to spend two per cent of their gross income on industrial research to safeguard their future. This particular percentage represents the average for 188 companies surveyed by the National Association of Manufacturers' advisory committee on scientific research headed by Dr. Compton. Two per cent of the value of the bituminous-coal tonnage, f.o.b. mines, in 1938 was the tidy sum of $13,100,000. And workers for continued research in that industry were forced to sweat blood, tears and invective to secure pledges for less than $125,000 to carry on a modest three-year program sponsored by Bituminous Coal Research, Inc.!

• TOO OFTEN investment in modern preparation-plant facilities has been looked upon as an unavoidable expense forced upon the reluctant producer by competitive conditions. Such a viewpoint, however, will not bear critical analysis. Substitution of mechanical units for old-style hand-picking means a definite lowering of the labor cost per ton for cleaning. Moreover, it sometimes means a sharp increase in average realization on sizes for which the producer has had no strong market. One small operation not only recovered its initial investment but also an additional profit of 25 per cent the first year it installed a washing table. This may be exceptional, perhaps, from the standpoint of quick returns, but it is clearly indicative that the negative expense approach to the investment is not justified.

### No Boiling Pots

MINING COMMUNITIES have been great melting pots for the assimilation of men of many nationalities. Although selective immigration laws have cut down the numbers and changed the racial proportions,

many communities still embrace citizens whose roots go back to many foreign lands. Present conditions may involve painful tests of their loyalties and also may provoke a transplanting of antagonisms which should be discouraged. The Union Pacific Coal Co. has met both phases of this situation with a forthright notice to its employees which concludes:

"Each and every one of our employees must continue to give the fullest measure of obedience to our Constitution and our government and respect for the American flag. Those who seek to do less cannot remain in our employ. Furthermore, there must be no rancor, hatred or prejudice shown by any one employee to another who by accident of birth once lived under another government. We today are all Americans, to work, to serve and to pay, as the necessities of our government may require. There is no other condition possible."

## Leaning Backward

COSTLY delays in securing the advantages of conveyors or other new methods in medium and thin seams often are caused by a prolonged trial period in a section of the mine with the most difficult conditions. In the meantime, new equipment of that type might be earning a handsome return in the rest of the mine. And, due to the abnormally bad conditions in the test section, equipment possibly may be rejected for the whole mine which would be an excellent paying proposition in those sections with normal conditions.

In the 20's most of the mechanical methods were tried out in the best sections of the mines. Moved to normal territory, the equipment in some cases failed to live up to expectations. Word of these instances induced the more cautious operators to swing to the other extreme.

Under the conditions normal to a mine, hand loading into cars may be earning a small apparent profit. The natural urge in that case is to find a means of resuming or initiating production from the section having low coal or some other unfavorable condition. A far better proposition may be the mechanization of the normal sections, leaving the more difficult areas until experience has been gained and, perhaps, better methods and equipment have been devised.

## Lessons Learned

UNITED STATES plunged into World War I with little advance long-range planning and less actual preparation. Early attempts at coordinating the resources of government, industry and man power flamed with patriotic zeal, but lacked the strength of experience. Emergencies which should have been foreseen were not always anticipated. When they arose they were met with makeshift decisions which added to confusion. Heatless days and lightless nights while mines clamored for cars to move coal to hungry markets were symbolic of spur-of-the-moment planning.

Because the pace of that war was more leisurely, nations with ample resources could muddle through without risking annihilation. That risk is too perilous today. It is reassuring, therefore, to know, as pointed out by Louis Johnson, Assistant Secretary of War, in his article in this issue of *Coal Age*, that impediments to the maximum functioning of the industrial machine already have been spotted and plans made for their elimination. The enlarged national-defense program should be an opportunity to test how effective these plans are.

## Even Feed

EVERY mechanical anthracite preparation plant must be tuned to suit the quantity and quality of the raw feed to be cleaned. When that tuning is complete, every effort should be made to supply the same kind and quantity of feed. Superintendent and foremen should help the preparation manager by keeping the flow of coal as steady as possible and by bringing cars from various beds and mine sections to the dump in such representative order that the analysis of the raw feed to the washery will vary as little as the desired analysis of the final product. Usually the preparation manager is sacrificed by the indifference of the production staff to the fact that a washery must have a fixed feed if best results are to be secured.

## Double Security

IN COUNTRIES where compulsory military training has long been established, its operation places little burden on peace-time commercial pursuits. The reason is simple: the period of intensive training precedes the individual's entrance into the business world. Where such a program must be launched on an emergency and temporary basis, however, some dislocation and disorganization of normal industry are inevitable. This is a fact to be faced, not an argument against such a program.

Under the Burke-Wadsworth bill now before Congress practically every man between 18 and 65 must register. Men between 21 and 45 would be liable for training and service in the land and naval forces. This training period would be twelve months, with the possibility of an additional month not oftener than three years out of five in the next decade or until the age of 45 was reached. Men between 18 and 21 and between 45 and 65 would be liable for training and service in home-defense units "near their residences."

Obviously this or any similar program means upsets and disorganization in personnel. They are inescapable if we are to have adequate national security. But employers can and should see that this security is not purchased at the expense of their employees. A Midwestern coal-mining company already has set the pattern by assuring its workers that any employee called for training or service will find his same job at the same pay waiting for him when he returns. Here is a pattern which American industry should make national.

# COLORADO CONVEYOR MINE

## Produces 7 to 10 Tons per Man-Shift In Thin Seam Averaging 4 Ft. in Thickness

By IVAN A. GIVEN
*Associate Editor, Coal Age*

STARTING in June, 1937, with one unit, the Calumet No. 2 mine of the Calumet Fuel Co., Delcarbon, Huerfano County, Colo., went on a 100-per-cent shaker-conveyor-and-duckbill basis in April, 1939, and since that time has moved into the front rank of efficient thin-coal conveyor-mining operations. Production per man employed underground, depending upon season and development work under way, ranges from 7 to 10 tons per shift in coal averaging 4 ft. in thickness. Conditions include considerable brushing and handling of top material in sections where poor roof is encountered.

Calumet No. 2 produces "Calumet Chief" coal from the Cameron seam, which runs as low at 3 ft. and up to 5 ft. The general dip is around 2 per cent southwest and cover over present workings is about 325 ft. Pillars are taken immediately upon completion of a room, supplemented at intervals by removal of room stumps and chain pillars. The seam proper is classed as clean and is underlaid by about 2 in. of "blackjack" on, usually, 3 to 4 in. of fireclay followed by sandstone. The cut is made over the blackjack. Top mostly varies from a fine-grained good sandstone to a poorer sandstone conglomerate, replaced in some sections by drawslate up to 3 ft. thick.

A 29-per cent rock slope 550 ft. long is the main haulage opening at Calumet No. 2, where A. P. French is superintendent. This slope connects to a coal slope driven some 2,600 ft. down the pitch to a flat entry about 1,200 ft. long across to the main dip entry. Trips of 10 cars (cars about 10 tons; coal, 15 to 16 tons) are pulled up the main dip entry by a 50-hp. single-drum hoist fitted with a ¾-in. regular-lay rope. A second 52-hp. hoist, complete with rope, is set farther up the entry and is available in case of trouble with the first. After the first hoisting stage, trips are hauled across the flat entry to the main slope by either a 4-ton Goodman or a 5-ton Jeffrey trolley locomotive. It is planned to equip the Goodman machine with a cable-reel and use it on a new flat entry to a new working territory, leaving the main flat haulage to the Jeffrey.

The main hoist is a Denver Engineering Co. clutched-drum unit driven through gears by a 375-hp. motor. The rope, 1⅛-in., is Lang-lay. This hoist, with a rated speed of 800 f.p.m., has a capacity of one trip every 9 minutes. A second Vulcan of Denver standby unit is equipped with a 150-hp. motor and can handle 8-car trips at 600 f.p.m.

Room, or flat, entries, consisting of two 14-ft.-wide headings separated by chain pillars 24 ft., or four cuts, thick, are turned northwest off the main dip entry and are angled slightly up the pitch to provide a favoring grade for the loads. Room entries now in use are approximately 2,000 ft. long, or enough for 44 rooms. They are spaced far enough apart to provide for rooms 270 to 300 ft. deep, the latter in new work, plus a 20- to 25-ft. barrier against the airway of the next entry above. Leaving the barrier makes it possible to keep each room entry on a separate split of air, brought in by an overcast.

The room entries now in service were, for the most part, driven by hand, although some were finished by conveyors. Room-entry development with conveyors is shown diagrammatically in Fig. 1. Development of such entries, in the future, will be done primarily in the summer off-season with the shaker conveyors. Unless drawslate must be taken, no top or bottom is removed in the lower heading, or airway, and the conveyor therefore is set on the center line. The coal is brought over to the opposite, or haulage, heading by means of a 90-deg. turn.

In the haulage heading, 1 ft. of bottom 7 ft. wide is taken on the upper side of the place for a roadway, unless drawslate is present and therefore has to be taken down. In driving the haulageway, the conveyor is set on the bench on the lower side just far enough from the roadway edge for the props on which the pan-supporting chains are placed to be set. The pan line is paralleled on the lower side by the ventilating tubing. The bottom brushing having previously been carried to the face, three pans and the drive are placed, with a curved chute, made at the mine, to feed the coal into the cars. This provides enough space inby the discharge chute for about four cars at the start. As the heading advances and brushing is extended, additional track is laid for a trip of ten cars or more. When the two headings have been advanced the limit for easy conveyor operation, the conevyors are dismantled, the drives moved up, the permanent haulageway track is laid, and the process of driving is repeated.

Brushing, in case no drawslate is present, usually is done in the bottom and is kept up to within three or four cuts of the face in the haulage-

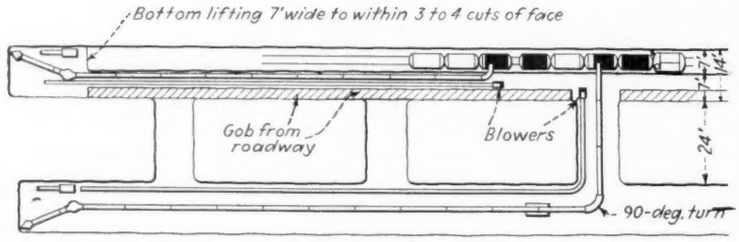



Fig. 1—Diagrammatic sketch of entry development with conveyors at Calumet No. 2.

way. Brushing normally is done by separate crews of two men working two shifts, each crew shooting the bottom in lifts of two to four holes. The broken rock then is thrown across the conveyor line and tubing against the lower rib, which becomes the disposal site for all brushing material or drawslate.

No brushing is necessary in rooms, although, where it occurs, the drawslate, being loose, must be handled. The goal in rooms is to try to hold the drawslate long enough to get the coal out, and then, after each cut, either let it fall or shoot it down and load it out, using the duckbill the same as in coal.

Rooms are not started at Calumet No. 2 until the entries are driven to their limits. In other words, room work is done on the retreat. As necks are not driven as the entry is advanced, the practice, using a separate cutting machine, is to drive a group at a time in about three cuts, or 18 ft., loading the coal by hand. In the active season, necks may be made only as needed. At other times, six or eight may be prepared at a time. The 18-ft. depth provides sufficient room for the initial conveyor set-up, although the places must go another three cuts before the conveyor gets down to normal working level and the duckbill can be installed. On some of the conveyors, the discharge end is carried on cross timbers; on others, rocker-arm suspensions are used and have been found to be, in general, more efficient.

Room depth varies from 270 to 300 ft., the latter in new work. Width is 28 ft. Centers are 42 ft., leaving pillars about 14 ft., or two cuts, thick. Two adjacent rooms, each with its own conveyor, are worked on each entry, as it has been found that car loading can be arranged so that there is no interference. The practice, as a rule, is to arrange room driving and pillaring so that the outby room is just reaching its limit about the time the pillars are taken out down to the stump in the inby place.

In pillaring, the duckbill is removed and the pillars are taken out by hand loading, using a 30-deg. swivel to turn the pan line to the coal. The swivel is placed as far back as is practicable and, if timbers do not interfere, the end of the conveyor is swung over. If timbers cannot be reset, the pan line is taken apart and relaid behind them. Room pillars are removed by slabbing, usually 30 ft. at a time. When the first slab is completed, the second is cut through to the gob, shot and loaded. Then the conveyor is shortened and the crew drops back to repeat the process on the remainder of the pillar, as indicated in Fig. 2.

When some six or seven rooms have been worked down to the stumps, these stumps and the entry chain pillars are recovered substantially as shown in Fig. 3, using the same two conveyors employed in room work. In recovering stumps, the practice is to slab the one for the inby room, loading the coal into cars standing on the regular storage track. The conveyor drive then is set and enough pans are put on to reach the next stump, which is slabbed, shot and hand loaded into the conveyor—fitted with the curved discharge chute for loading cars. This process of slabbing the stumps and lengthening the conveyor is continued until the last stump is reached, whereupon a 30-deg. swivel is placed in the pan line and two more slabbing cuts, or enough to complete it, are taken out of the last stump. The crew then drops back to the next stump and takes out the two finishing cuts, repeating the process until the work comes down to the last two or three stumps, which are left in to protect the storage track used in starting the next group of rooms.

Extracting the chain pillars follows substantially the same plan in headings which have been driven by hand. In other words, the chain pillars are slabbed on the airway side to permit installation of the conveyor, including a 30-deg. swivel or a 90-deg. turn and plans as required through a slant or crosscut to the cars on the haulage entry. Whereupon, starting on the inside, the pillars are removed by slabbing them their full length, except that, where conditions make it desirable, the last lift in a pillar may be taken in two half-length cuts. All coal in both room-stump and chain-pillar extraction is hand loaded into the conveyors.

The practice of slabbing on the way up with the conveyor was adopted to provide a good bottom on which to set props for suspending the conveyor and holding the top, as otherwise they would have to be set in the roadway where bottom had been taken and posting conditions therefore are not as good. And in the haulageway, the slab on the upper side permits installing the conveyor without interfering with the car-storage track. Slabbing necessarily will be continued in the future in the case of stumps, inasmuch as they are recovered from the haulageway, but with entry-driving with conveyors, meaning that brushing a road in the airway is unnecessary, it may be possible to eliminate preliminary slabbing in chain-pillar recovery.

Calumet No. 2 production is derived from four shaker-conveyor units. One is a G-15 Goodman, two are G-20's and the fourth is an Eickhoff MTA-15 machine with a drive rebuilt at the mine. All four machines have Goodman automatic duckbills, although these normally are used only in solid work—principally room driving. Each conveyor unit

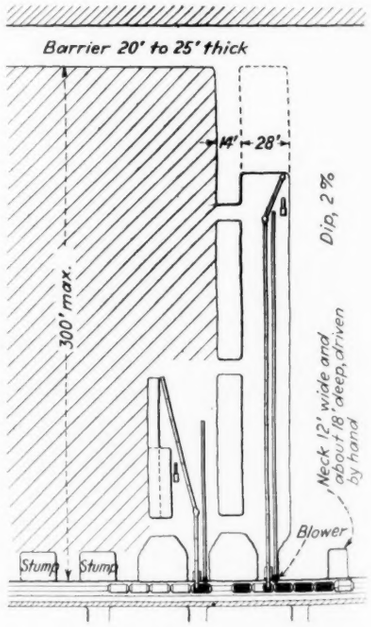



Fig. 2—Room-driving and pillaring plan.

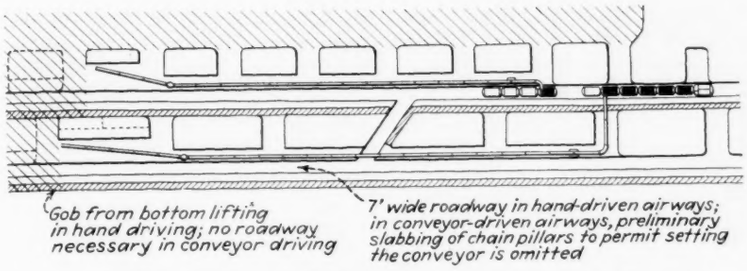



Fig. 3—Showing diagrammatically how room stumps and chain pillars are recovered at Calumet No. 2.

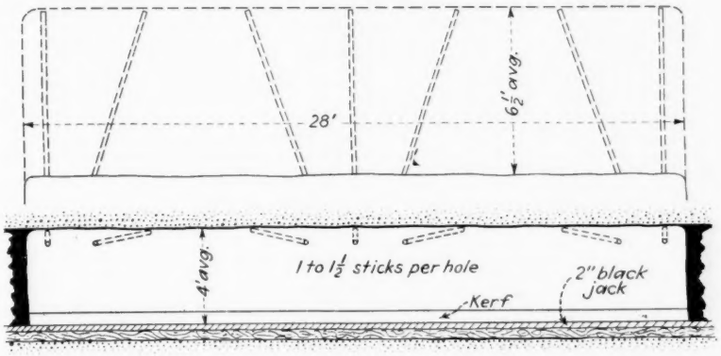



Fig. 4—Drilling plan for a 28-ft. room. When lump is in good demand, only five holes are drilled, omitting the angle holes nearest the ribs.

also includes a Sullivan CE-7 short-wall with 7-ft. bar, a Jeffrey post-mounted drill with conveyor-type augers fitted with Coalmaster heads and bits, a Jeffrey room blower using Mine-Vent tubing and a cable-junction and starting panel developed at the mine. Auxiliaries naturally include such items as swivels, 90-deg. turns, curved discharge pans and the like.

Conveyors, except at the discharge end, where cross members or rocker arms are used, are suspended from posts by welded-on hooks and chains. However, a ball frame, fitted with special cross and side rails so that it can be held down by a post on each side rail, is installed every five or six pans. This has been found very effective in preventing side sway and whipping, as well as vertical bouncing, both tending to break bolts and buckle pans, particularly when the duckbill is in use. Conveyor-drive motors, where cross members or chains are used for suspending the discharge, are protected against conveyor falls by passing ½x6-in. straps of steel across the tops of the drives, turning the ends down and bolting them to the frame. Pans are fastened together by bolts and, in case of breakage, two head sections are welded together, after which one head is cut off and threads run on that end to make a new bolt. And where swivel jacks are hard to hold, a special base is employed, consisting of a base member about 1 ft. square with saw teeth on the bottom and a socket on the top to take the swivel jack.

A crew for a conveyor normally consists of four men, although occasionally three or five may be employed. One, the "button man," operates the conveyor and trims the cars. Communication between the button man and the face crew is provided by a pushbutton station on the end of a cable carried to the face, which operates a signal bell on the control panel. The three men at the face, with assistance from the button man when loading is not going on, cut, drill, shoot and load, extend timber and the pan line and do all other work necessary to keep a place going. When not engaged in regular coal production, conveyormen work at other mining jobs, such as preparing sections or places for production, including hand-loading of room necks, brushing, etc.

It will be noted that each crew includes a button man. With auxiliary equipment it is, of course, possible to bring the coal from both conveyors to a common point, which would necessitate only one button man instead of two. At Calumet No. 2, however, it is felt that separate button men are preferable, as this assures, since the coal flow to each loading point is smaller, better loading of cars. In addition, with the conveyors independent, both need not be stopped to change a car. Finally, the button man spends his time very profitably, when not loading, in handling supplies, assisting the facemen and taking care of odds and ends.

Pan length at Calumet No. 2 is 13 ft. 2 in. In addition to the suspension posts a room is protected by a minimum of two rows of single posts on either side of the conveyor, plus three or four safety posts at the face, which are reset as necessary for the operation of the duckbill and other equipment. A continuous cycle is worked at the face, and the practice is to first shoot down the center of the cut and load it out with the duckbill. The sides then are shot and the duckbill is worked to the right to clean up that side. Safety posts are set as the coal is cleared away.

When loading is completed on the right, the duckbill is swung to the left to finish the cut. The cutting machine then is skidded to the face, sumped in and started to cut. With the advent of conveyor mining, bars on cutters accompanying the conveyors were lengthened from 6 to 7 ft. by welding in a 1-ft. section. Bowdil

Superintendent A. P. French (right foreground) looks on while the duckbill cleans up the right-hand corner in a 28-ft. place.

chains and throwaway bits are employed, primarily to eliminate the problems of sharpening and handling the conventional type, inasmuch as the tons cut per point are about the same with either.

While cutting goes on, the duckbill cleans up the coal on the left, after which drilling is started and the extra man or men add a pan, if required, extend the timbering and ventilating tube, move up supplies and take care of other auxiliary tasks. When the demand for lump is not pressing, a 28-ft. room is shot with seven holes, placed about as in Fig. 4. In lump-coal season, five holes are used, the pattern being the same except that the angle holes otherwise drilled from the rib set-ups are omitted. As a rule, holes are loaded with 1 to 1½ sticks of Hercoal C permissible running 137 to 140 1½x8-in. sticks per 50-lb. box. Clay is used for stemming and shots are fired electrically. A reel equipped with a shorting plug as an additional safeguard holds the shooting cable. With the preparatory operations outlined above completed, the center of the place is shot down to initiate a new cycle.

Cars at Calumet No. 2 total 234, of which 125 are new Card steel units with Card-Timken roller-bearing wheels. The new cars are 10 ft. long (8 ft. inside), 50 in. wide, 22 in. high inside and 34 over the rail. They hold about 3,300 lb. mechanically loaded, against 2,700 lb. for the old wood cars. The three-link hitchings previously used are being replaced with single links, inasmuch as it has been found that the old-style links were being caught between bumpers, with consequent damage not only to the bumper plates but also to the links, with the resultant possibility of a break on a slope and a runaway or derailment in spite of the drags normally employed.

Partings holding about fifteen cars are constructed at the mouth of each room entry by widening the heading to about 16 ft., lifting the bottom all the way across and putting in a sidetrack for empty storage. In changing trips, therefore, the hoist drops in an empty and hooks onto the loads on the other track.

Cutting and drilling in a room in Calumet No. 2, with G. W. Gregory, foreman, checking for gas. Note safety posts at the face.

Room conveyor discharging into a new steel car on the room entry, which has bottom lifted for height. At the right are the room blower and control and signal panel.

### Battery Locomotives Used

Two conveyors work in adjacent places on each room entry, retreating from the back end. Two 7-ton Goodman locomotives (80-cell Exide-Hycap batteries) serve the four conveyors, each taking care of the two on a single entry. A locomotive pushes a trip of ten empties in to the conveyors, usually splitting them between the two. As a car is loaded at the outby conveyor, the locomotive pulls down to bring a new one into position. In the case of the inby conveyor, cars are controlled by blocking, and as they are filled they are cut loose and allowed to run down against the end of the other half of the trip.

If the outby part of the trip should be completed first, the inby button man releases a part load or an empty to the outby conveyor. If the inby unit finishes first, the locomotive pushes the entire trip back far enough to provide another empty. Thus neither conveyor has to stand idle because the other has the cars tied up. When a trip is completed, the locomotive takes it out to the parting. In the interim, the conveyor crews move supplies, timber, etc., and do other necessary work. Several small hoists and retarders are available for handling cars and trips when desirable, but normally the scheme outlined above is the most satisfactory.

Performance at Calumet No. 2—G. W. Gregory foreman—varies with seasonal demand and activity. In February, a typical active month, output from four conveyor units, plus a slight hand tonnage from room necks and other special work, was 8,732 tons. A total of 654 shifts was worked by conveyormen, including hand loading from room necks, etc. The total for all men underground was 877 shifts, and for all men, surface and underground, 1,291 shifts. In March, with the virtual end of the active season, attention was turned to pulling stumps and chain pillars, squaring up and otherwise taking care of odds and ends in addition to regular work. The tonnage was 4,287, with man-shifts as follows: conveyormen, 393; all men underground, 614; all men at the mine, 909.

Both d.c. at nominally 250 volts for the trolley locomotives and a.c. at 440 volts for the operation of all other underground and surface equipment, including battery-charging sets, are used at Calumet No. 2 mine. The surface works are served by three 80-kva. transformers, with two underground stations (three 37½-kva. transformers each) for operating hoists, cutters, conveyors, drills, blowers, battery-charging sets, etc. A 75-kw. m.g. set supplies power for the trolley locomotives.

Small-sized circuits and lengthening distances resulted in a change some years ago to the present primary distribution system. Incoming mine power, at 6,600 volts, is received through an oil switch which, in accordance with Colorado law, is electrically interlocked with a vacuum switch on the fan so that in case ventilating pressure drops, all power is cut off the mine. From this oil switch a lead-covered cable (No. 2 wires) buried in a trench extends 3,000 ft. to and down a drillhole to one transformer station. An extension of the same cable carries 6,600-volt power to the second underground station. From these transformer stations, inclosed in concrete-block vaults, 440-volt current is carried to the points of use by No. 4 rubber-covered stranded conductors (size 0 in some cases).

### Panel Board Control

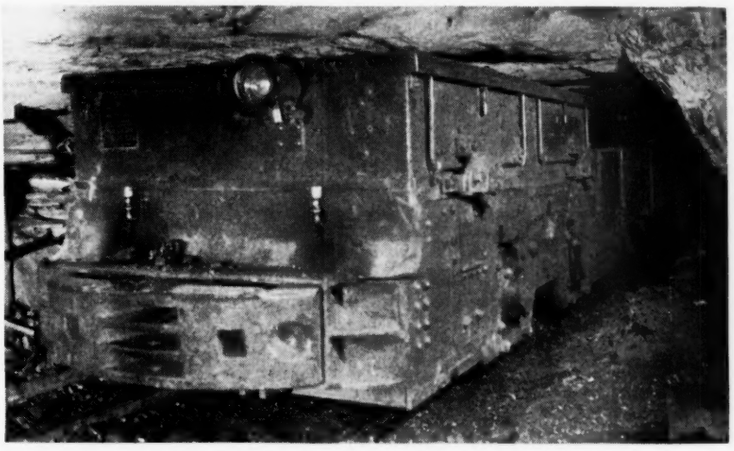
Controls, cable connectors and signals for conveyor units are concentrated on control panels built by Lawrence Vickers, master mechanic and outside foreman. The panels consist of boards bolted to standards fitted with jackscrews for holding the panels in place. On each panel is a signal bell and a pushbutton-operated Cutler-Hammer magnetic starter for the conveyor motor. In addition, the panel is fitted with a complete set of Miller connector plugs and receptacles (mostly the latter) for both incoming and outgoing power circuits, the latter to the conveyor motor, blower motor, cutter and drill, etc. Additional connectors are provided for control and signal circuits, including the circuit from the pushbutton station to the magnetic conveyor starter and from the signal pushbutton at the face to the bell signal on the board.

The cutting machine and drill are fitted with short stub cables with plugs which fit into a double receptable on the end of a supply cable long enough to reach from the control panel to the face of the deepest place. Thus, two long cables, with their attendant drawbacks of extra cost, extra handling and increased possibility of shock, are avoided. In the latter connection, Calumet No. 2 follows the practice of grounding the frames of cutters, drills and other equipment to the conveyor line, sprinkling line or rail as an extra safeguard.

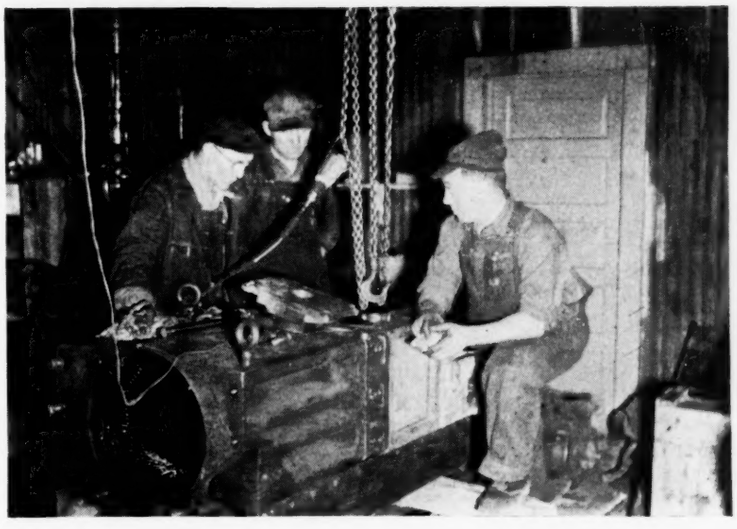
All equipment used at the face is either explosion-proof or permissible. Edison electric cap lamps are worn by the miners; sprinkling lines are installed in each place, and rock-dusting is done regularly with an M-S-A machine. Goggles, hard hats and safety shoes are worn by all employees.

The preparation plant at Calumet No. 2 is equipped to prepare the following sizes: 8-, 6- or 3-in. lump; 8x3- or 6x3-in. grate or stove; 3x1¼-in. nut; 1¼x¾-in. pea and 1¼- or ¾-in. slack. Lump, grate or stove, and nut may be loaded over booms or Manierre box-car loaders installed in 1939.

Mine-run is passed over a Dings magnetic pulley to remove tramp iron and then, if not passed on to the regular sizing screens, may be run into an adjustable double-roll crusher for reduction to as small as minus 3-in. Minus 1¼-in. then may be screened out and the 3x1¼-in. sent to a Jeffrey "Flex-Tooth" crusher, where it also may be broken to minus 1¼-in. Thus it is possible to break down the entire mine output to screenings. On the other hand, only part of the coarse sizes may be crushed, as desired, leaving the remainder for regular loading. All sizes may be "Dusprufed" with oil and "Catalyzed" to improve combustion characteristics.



Trips are handled on room entries by 7-ton battery locomotives.



Lawrence Vickers, master mechanic and outside foreman, left, looks into a repair question.

# INDIANA STRIPPERS

## Meet Attacks on Open-Pit Mining By Turning Spoil Banks Into Beauty Spots

**"You're ruining valuable lands forever with your shovels and ugly spoil banks," has been a favorite cry of those who would legislate stripping out of existence. That much of the acreage so exploited was waste or abandoned before stripping started seems to carry little weight. But in Indiana, where last year 54.71 per cent of the coal was strip-mined, operators have taken a constructive offensive against such campaigns by turning worked-out areas into State forests and recreation centers.**

By VANCE SAPPENFIELD
*Linton, Ind.*

IN THE early days of strip mining, overburden was cast haphazardly to one side, the coal was loaded out, and the spoil banks were allowed to stand naked and ugly in unsightly, uneven ridges. Erosion then took control and, in a few short months, these ridges had been cut into grotesque patterns by rain and surface water. Sumac, scrub oak, blackberry briars, pokeweed and similar undesirable vegetation alone were hardy enough to grow on the overburden slopes. And public criticism of this condition grew as stripping activities increased.

Officers of large stripping operations in Hoosierdom and the Indiana Coal Producers' Association began "to do something about it" more than a decade ago. They knew, of course, that the land which had been turned into seemingly barren wastes had usually been marginal or submarginal acreage before they started mining and that, therefore, it was not suitable for profitable crop farming. Foresters, however, told them that the overburden slopes were ideally adapted to the growing of certain types of trees and recommended a program of planting. Since the prehistoric forests had furnished the basic elements of coal, the foresters added, it seemed fitting that the land should revert to the growing of timber.

First planting of spoil banks on anything like a large scale took place about 1928, when coal companies owning worked-out stripping areas purchased seedling trees from the State nurseries. White pine, American red pine, Scotch pine, black walnut and black locust were planted at that time. Plantings were divided about equally between evergreen and deciduous types. Because of its hardiness and adaptability, however, in recent years the black locust has far outnumbered all other types planted.

A forest land-classification act, passed in 1921, provides that landowners may reduce tax assessments on forest land to $1 an acre a year if certain fundamental rules are followed. Practically all Indiana companies engaged in replanting have been "classifying" their acreage to take advantage of this special tax rate. To qualify under this rate, land must have a "sufficient density" of trees per acre to be classified as a forest. This, of course, is an incentive to intensive planting.

Current records of the Indiana State Department of Conservation show that State nurseries have sold approximately 6,500,000 trees to Indiana coal companies for planting on worked-out stripping areas since the forestation program was launched. Acting through their association, these companies purchased 750,000 young trees this year. Black locust is in the lead in 1940 purchases because, according to Harry C. Hyatt, former Cleveland (Ohio) City Forester and now director of conservation for the Indiana Coal Producers' Association, it is a "fast-growing tree which is also a soil builder, similar to clovers in farm practice. It will act as a nurse crop for more permanent planting."

As part of its policy of planning for the future, the association also is planting three experimental plots of ten different varieties of trees in three widely separated localities. Ten different varieties of evergreen are being planted in each plot so that studies may be made to determine which variety is best suited to the locality and varying moisture and soil conditions. Since the program of large-scale planting was started in 1935, approximately 1,000,000 trees have been purchased annually from the State nurseries. Except in 1936, when dry weather killed a large number of newly planted trees, efforts at forestation have been highly successful.

These young trees, reports the State Conservation Department, usually are planted 6 ft. apart. This means approximately 1,200 trees per acre. On this basis, eliminating the

One of thousands of lakes to be found in land mined by strip shovels. This lake is two years old and has been stocked with game fish by the Indiana State Department of Conservation. Its banks, spoil-bank slopes, are now ready for tree planting.

750,000 trees lost in 1936 because of the dry weather, the coal companies have purchased enough trees to plant about 4,700 acres. Since small and large lakes have been formed in the valleys between the overburden slopes, however, it is more likely that from 7,000 to 8,000 acres of land and water have benefited from the planting program. The cost of purchasing the trees and the work of planting is estimated at about $20 per acre. This cost is borne by the interested coal companies. In other words, these companies already have spent more than $94,000 in returning otherwise useless land to vegetation.

A 100-acre tract near Linton has been deeded to a Boy Scout troop by the Maumee Collieries Co. The scouts supervise the trees during the year and also assist in planting work. During the holiday season they cut down hundreds of evergreens for sale locally as Christmas trees and realize a good profit for their work. This cutting is done in such a way that the life of the tree is not harmed and the tree is able to continue its growth unimpaired. At the solicitation of the city park board, the company also has given Linton a 600-acre tract which was planted in trees, mostly conifers, about ten years ago. The park board plans to stock lakes in the tract with fish, make bridle paths, build lodges, construct fish-rearing ponds and mark off a rifle range for the use of the general public.

Another plot of 1,358 acres of partially stripped-over land near the boundary lines of Sullivan and Greene counties has been donated to Indiana for a State forest by the Central Indiana Coal Co. All this area has been planted with trees. It contains six lakes with a combined area of 22 acres. Three of these lakes are 1.5 miles long and 100 to 300 ft. wide. According to the State Department of Conservation, this forest land "offers a very good example of the utilization of strip-coal areas so frequently found in this section of the State."

Pioneers in this Indiana tree-planting program may not have realized it at the time, but they were laying the foundation for a work which may some day turn the southern part of the State into a paradise for fishermen. About ten years ago members of Izaak Walton leagues and State conservation clubs began stocking lakes formed by strip mining with game fish such as black bass, bluegills, crappies, redears and catfish. This restocking has been carried on annually since and today many of these lakes teem with hundreds of game fish.

Chambers of commerce and other civic organizations in various commu-

Evergreen trees planted ten years ago appear in the background; in the foreground is submarginal land in original state, untouched by strip shovels. The land in the foreground is typical of that mined by stripping.

Results of tree planting thirteen years ago. This picture shows land owned by Central Indiana Coal Co. in Sullivan County. Spoil banks in foreground have not yet been planted.

nities in the area where fish have been released are beginning to become enthusiastic about the sport which may be found in the thousands of large and small ponds. More and more fishermen from all parts of Indiana and from adjoining States are taking their tackle to the section. Cities which are boasting about the fishing to be found in these lakes include Brazil, Terre Haute, Sullivan, Linton and Bicknell. Near the small town of Coal City, a conservation club, sponsored by the State Department of Conservation and aided by WPA funds, has built an artificial lake—Lake Tapawingo. The lake has been stocked with game fish and Coal City is receiving Statewide notice because of the sporty fishing which can be enjoyed in that body of water.

The scenic beauty of the former overburden slopes is growing from month to month as the trees increase in size. Already some enthusiastic civic organizations are beginning to visualize that section as one of the nation's beauty spots in the near future. One such organization recently pointed out that "vacation seekers don't go to the flat prairie land for their outings, but seek the irregular hills, mountains or lakes. When the trees in the former spoil-bank area attain their growth, we venture to say that southern Indiana will become another Yellowstone Park."

Speaking in terms of business investment, the trees which have been planted probably will more than repay their original cost in a few years in timber. Some of the companies believe that it is not at all unlikely that a pulpwood industry will be attracted to this section after the trees are somewhat larger. Some of the locust trees already have been cut for fence posts and this year thousands of such trees are ready for the cutting. In the opinion of members of the coal producers' association, this section of southern Indiana offers a "perfect rebuttal" to the argument in favor of leveling off spoil banks after stripping has been finished.

Since the inauguration of this forestation program and including figures for the spring of 1939, a total of 5,650,075 trees had been planted. Distribution by varieties was: American red pine, 137,500 trees; white pine, 472,550; Jack pine, 82,200; Scotch pine, 282,425; shortleaf pine, 4,200; Virginia pine, 52,000; black locust, 3,609,200; black walnut, 508,000; American elm, 500 trees.

Ten-year-old planting north of Linton, Ind.; part of an area deeded by the Maumee Collieries Co. to a Boy Scout troop and the source of hundreds of evergreens cut each year and sold for Christmas trees.

# HOW DEFENSE PROGRAM

## Launched by National Government

## Will Affect Coal-Mining Industry Operations

**Assistant Secretary of War Johnson stole the show at the fuel engineering dinner staged by Appalchian Coals, Inc., in Washington a few weeks ago. He did it with an address on the importance of coal in the national-defense program. But coal's ability to do its part is in turn dependent on how that over-all program affects mining operations. So Coal Age asked Mr. Johnson to answer some pointed questions on that score. He does so in this article, written prior to his resignation as assistant secretary, July 25.**

By LOUIS JOHNSON

COAL is vital to any soundly conceived national-defense program. The essence of such a program, of course, is coordination—coordination of natural resources, manufacturing, transportation facilities and man power. All must be integrated properly for the most effective utilization. And the job must be done quickly if we are to build an adequate national defense before it is too late.

Speed! In these days of week-end *blitzkriegen*, a year, as I said to the Appalachian Coals conference, has become a decade and the corresponding responsibility upon industry even more serious than in the preceding World War. A large part of that responsibility rests upon the coal industry. This is cold fact. Coal is indispensable to industry. Industry is indispensable to munitions. Munitions are indispensable to victory in war. So the part of coal in the program is plain—and tremendous.

We had some bitter experiences in the last war. Man power affected by enlistment. The flow of coal impeded by transportation difficulties. Makeshift methods adopted to meet emergencies. Heatless and lightless nights! Different agencies with the best of intentions working at cross purposes. We had time then to blunder through. Today we cannot take that chance. We must plan and coordinate in advance of action.

### What About Man Power?

Let's begin with man power. Plans for the war-time draft must consider the deferment from induction into the armed service all essential workers in essential industries. In the administration of any peace-time universal service act that may be passed by the Congress, I am confident that the need for such deferment will be fully recognized and properly met.

As part of the defense program, careful study has been given to existing manufacturing plants and the kind of implements of war each type of plant might produce. That study indicated that manufacturers of mining machinery might be a source of light armored tanks. In planning the placement of the war load, however, the needs of essential industries and of the civil population have been given adequate consideration. The production of necessary mining machines, therefore, will not be interrupted. The priorities division of the Army and Navy Munitions Board determines the priority between the various agencies of the army and navy. A priorities division, to determine the priority between military and civilian requirements, will undoubtedly be set up in the advisory commission of the Council of National Defense whenever the commission deems it necessary.

### No Clash on Explosives

While the defense program naturally calls for a greatly increased output of explosives, I foresee at present no interference with the essential needs for explosives by the coal-mining industry. Production for the armed forces will be obtained largely from newly created facilities or by expansion of existing facilities. Let me reiterate: The needs of these industries essential to the production of munitions are considered on a par with the needs of the armed forces.

No definite steps have been taken by the defense agencies of the government either to encourage industrial consumers to build up adequate reserve stocks of fuel or to encourage the storage of coal at the mines by the producers. A general appeal to consumers to buy and store coal early, however, was recently issued by the Consumers' Counsel of the Bituminous Coal Division of the Interior Department.

In the event of emergencies, it is planned to coordinate production of coal by cooperation with the interested federal agencies and the trade

*Harris & Ewing*

**Louis Johnson**
Formerly Assistant Secretary of War

associations concerned. This also brings up the questions of coordination of transportation between production districts and heavy consuming areas, priority in car supply to reduce wastes in transportation, and the geographical distribution of the war load.

## Transportation Coordination

Plans for transportation during a period of national emergency visualize the coordination of all means of transportation. Introduction of measures designed to conserve transportation facilities—measures that are not practicable in time of peace under strictly competitive conditions—must be carefully considered. Priorities to govern the allocation of transportation facilities may also have to be established in time of a grave national emergency.

The geographical distribution of the war load parallels the geographical distribution of industry. In order to make such distribution of the load, small industries have been allocated. As a result, 35 per cent of the allocated facilities have less than 50 employees. The area north of the Ohio and Potomac rivers and east of the Illinois-Indiana State line will bear approximately 60 per cent of the load. In the preceding war, it was estimated that 80 per cent of the war-material manufacturing was centered in that area.

## Export Policies

What the government policy on coal exports might be in the event of a national emergency is a question to which no categorical answer is possible at this time. The policies under which a War Trade Administration would operate undoubtedly would be determined in conformity with the foreign relations of the United States. In the last World War, exports were employed in the direct assistance to the Allies and in trade with neutrals in order to bring commercial pressure upon the Central Powers.

All plans for economic mobilization have their origin in the best experiences of the country during the last war. Conservation is envisaged for the purpose of (1) directing the resources into the prosecution of the war and (2) conserving national resources. To what extent peace-time production and commerce will be curtailed undoubtedly will depend upon the circumstances at the time and will be governed largely by the effect of specific conservation measures on the national morale. Conservation measures were introduced slowly during the last war and did not reach the maximum until the fall of 1918.

Production and transportation of coal are interdependent. In 1936, 84 per cent of the bituminous production was shipped by rail. There are at present 701,000 serviceable coal cars and 86,800 bad-order cars; approximately half of the latter can be made serviceable through repairs. The present railroad program contemplates the repair of 18,000 to 20,000 of these cars; the rest will not be repaired until the need for them appears. There are now approximately 5,600 new coal cars on order.

## Cutting No-Bills

As evidence of how increased transportation capacity may be secured, the recent action of the railroads in reinstating the 100-per-cent no-bill rule may be cited. No-bills normally exceed 40,000 cars; reestablishment of the no-bill rule is an attempt to cut this to 20,000 cars.

The lessons of the World War in handling transportation have been studied for years by the Army and Navy Munitions Board and by the railroads. Immediate corrective steps can be forecast if there is any appearance of uneconomic transportation. Creation of the advisory commission of the Council of National Defense to coordinate problems relating to the rearmament program will assure the development of effective procedure in government agencies, industry and transportation before the burden on the railroads becomes heavy enough to cause serious interference with production or transportation.

## Planned Objectives

When we were drawn into the last war, government and industry were without a background of experience to guide them. The war program itself was changed continuously, starting on the basis that the undertaking would be small and ending with the initiation of the vast program of the spring of 1918. Planning since then has been based on the thesis that a major military program will be undertaken immediately on the outbreak of war. Therefore the placement of a maximum, not a minor, load on the industrial resources of the country is planned. It is the essence of this planning that steps taken at any particular time—as, for instance, during rearmament—must be consistent with the objective desired in war for the fullest possible employment of the industrial and economic resources of the country.

# CAN SMALL OPERATIONS

## Modernize as Profitably as Big Ones?

## "Yes," Answers Lone Pine Truck Mine, in Utah

MECHANIZATION equipment can be just as big a help to a small truck mine as to a large commercial operation, experience at the Lone Pine mine, in Utah, has shown. Opened in upper Spring Canyon, Carbon County, in 1938, this mine, operated by the Lone Pine Coal Co. and producing "Lone Pine—The Perfect Coal," is equipped with a shaker conveyor, two cutting machines, two electric drills, twelve drop-bottom cars (five in regular use), an electric hoist and an electrified tipple.

Installation of this equipment was based on the identical principle underlying installations by the larger commercial mines: i.e., greater efficiency throughout. Aside from the difficulties and added expense in taking cars to the face in 48- to 56-in. coal, the conveyor reduces the lift in loading, as compared with loading into mine cars. Using swivel equipment, the face end of the conveyor may be placed in the best possible position for loading, shortening the distance coal must be shoveled and eliminating "turning" coal from far corners to the loading point.

One cutting machine and drill is used in development work, which normally is confined to the summer months and consists primarily in extending the main and driving dip openings from which rooms are turned. In this operation, coal is loaded into the cars by hand. The shaker, second cutting machine and drill are used for regular production from rooms and pillars, which reaches a total of 100 to 120 tons in two 7-hour shifts in times of good demand, particularly in winter. For this output, the total mine force, including a foreman and one man on the tipple each shift, totals thirteen. All employees are U.M.W. members and are paid the union scale.

Lone Pine mine, owned and managed by Mike Gambero, recovers the Castle Gate No. 3 Sub-Seam, ranging in thickness from 48 to 56 in. Thickness of cover varies fram 50 to 300 ft. The seam is free of regular banded impurities and is classed as clean; ash averages about 6½ per cent. Top is a tough, fine-grained sandstone which stands well. The bottom also is sandstone.

### Portal Elevation 7,500 Ft.

Elevation of the seam at the mine portal is approximately 7,500 ft. and it pitches slightly southwest a maximum of 8 per cent. The truck-loading yard is in the bottom of the canyon some 200 ft. below the portal, which is connected with the mine-run bin at the tipple by a 39-per-cent incline. Two short stub partings on the outside at the top of the incline accommodate trips of five cars each. These partings are necessitated by the fact that the hoist used—a 35-hp. Vulcan of Denver electric unit with a 38-in. diameter and a 36-in. face—cannot pull more than two empty cars up the incline. Inasmuch as 5-car trips are handled in the inside, the two partings on the outside are necessary to permit breaking them up for lowering, dumping and hoisting. Cars are Sanford-Day drop-bottom, 40 in. high over the rail, and carry an average of 2 tons.

The main mine openings consist of a haulageway and airway driven to provide a maximum grade on the haulageway of 5 per cent down to the portal. From this main, dip openings are developed down the pitch, with rooms turned off one side. Rooms are driven on the advance to the limit of the dip entry, and pillars will be removed on the retreat. Under this system (Fig. 1) the hoist is set just inby the top of the dip entry. Empty trips are pulled up past the switch and then dropped down to the conveyor discharge. Thus, all handling, both inside and outside, is done by the hoist, which is fitted with a ¾-in. rope.

With solid work on the advance and pillaring on the retreat, more conveyor moves are necessary than when taking out pillars as soon as the rooms are driven. Under the Lone Pine set-up, however, the number of extra moves will be reduced by taking two sets of room pillars per conveyor installation. With the conveyor in place, pillars on the lower side of the room will be mined first, then the upper side, using the swivel equipment to turn the conveyor to the right or left. The conveyor is then moved, for example, from No. 7 to No. 5 room, and the process repeated. Even with this doubling up, some extra moves are required, but this disadvantage is offset by the fact that the system, although necessitating solid work on the advance, primarily for reasons of ventilation, eliminates a substantial part of the more costly dip-entry development which otherwise would be necessary to permit full advance or retreat mining.

The Vulcan 25-hp. shaker conveyor is equipped with enough 13-ft. pans to drive a 370-ft. room. The pan line, except at the discharge end, where cross timbers are used, is suspended from posts by chains and "monkey-faces." Rooms 30 ft. wide on 50-ft. centers are so driven that completion of the rooms automatically starts the next dip entry. In other words, rooms are driven full width for approximately 331 ft., then narrowed to 14 ft. and driven about 39 ft. farther.

Finally, one slabbing cut—on the center line of the new opening—is made on each side of the place at the point where it was narrowed. Thus, most of the work for the new dip entry is completed before the conveyor is taken out of the room. Thereafter, it is necessary only to drive down from the main slope and complete the process of cutting through the pillars. In removing pillars in rooms off the old entry, it is the intention to leave 20-ft. stumps along the new (Fig. 1) to protect it on the gob side.

When the new dip entry, which is the new haulageway, is cut through, the remaining narrow part of an old room forms the neck for a new room and is just deep enough—26 ft.—measured from the rail, for the initial conveyor set-up. Under this system development of a new room section is greatly simplified, as compared with driving separately a complete new dip entry, including haulageway, airway and room necks.

Cutting in dip-entry and other development work is done with a Goodman universal shortwall, 6½-ft. bar, and drilling by a Dooley post-mounted unit. Cars have loose boards on the sides, which are removed in entry development to permit loading through the irons. To complete a dip haulageway for use, the roof is brushed 2 ft. at the loading stations, tapering down to 1 ft. elsewhere. Brushing also is carried up the room necks some 20 to 25 ft. to permit elevating the discharge end of the conveyor. Here, also, the development system is advantageous in that it is much easier to do all the necessary coal work in advance and thus clear the way for taking down the top.

In starting the first room in the new section the dip entry and haulageway (Fig. 1) serves for a time as the intake airway and then is converted into a return. In the initial stage of driving No. 1 room, the air comes down the haulageway and is directed to the face by a brattice line, returning through No. 1 room on the old entry, which is kept open by leaving the pillars. About the time the new No. 1 room reaches its maximum width a 45-deg. slant is turned and driven up to intersect the main airway. This slant then becomes the intake, and as new rooms are driven, light stoppings are installed to direct the air through the room crosscuts and along the faces to the last place, through which it returns to the haulageway. Incidentally, except for the slant, this system eliminates driving a separate airway parallel with the haulageway.

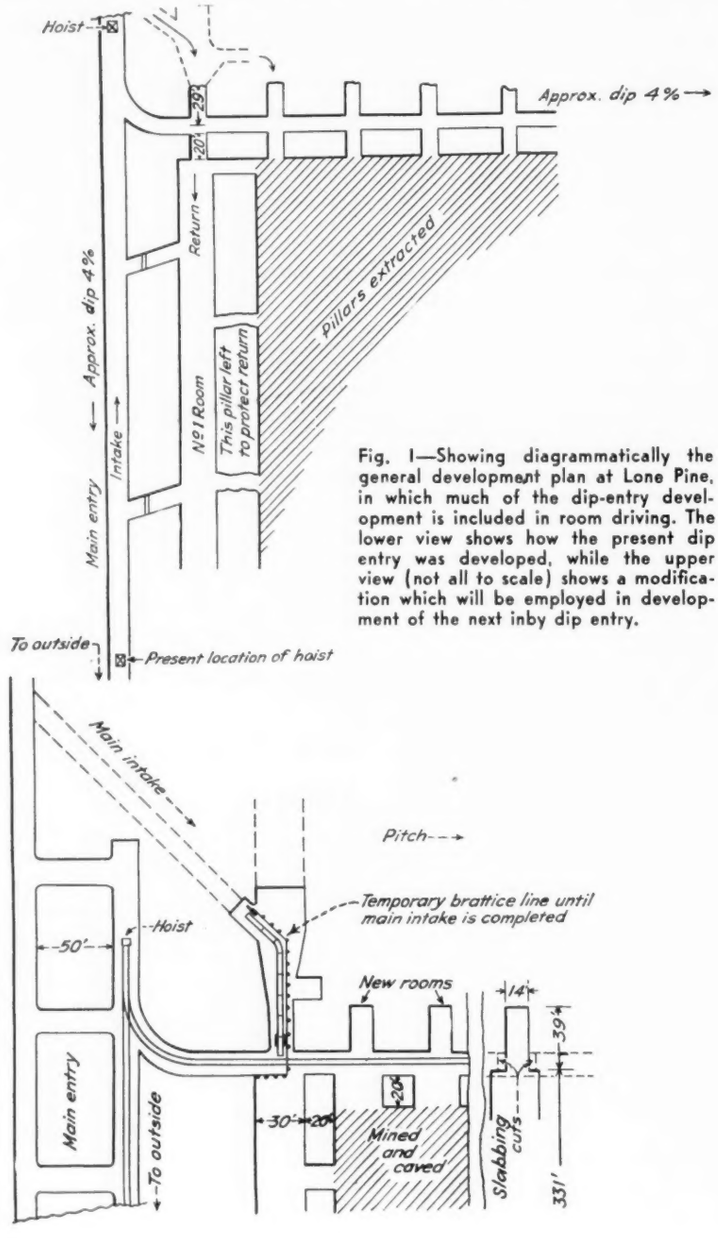
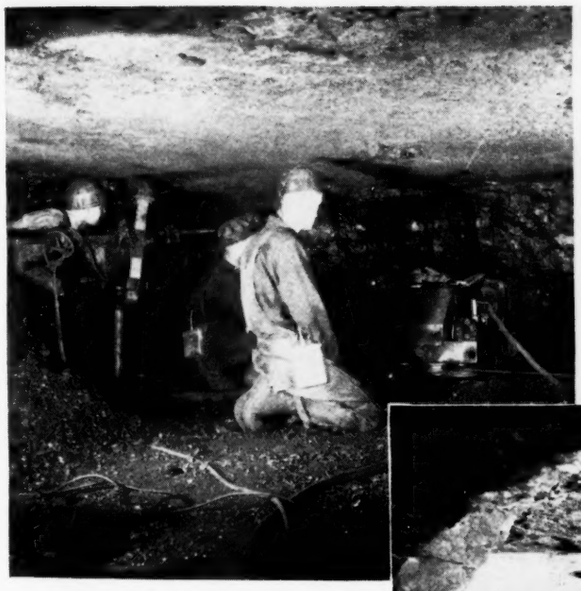



Fig. 1—Showing diagrammatically the general development plan at Lone Pine, in which much of the dip-entry development is included in room driving. The lower view shows how the present dip entry was developed, while the upper view (not all to scale) shows a modification which will be employed in development of the next inby dip entry.

## Maximum 5-Man Crews

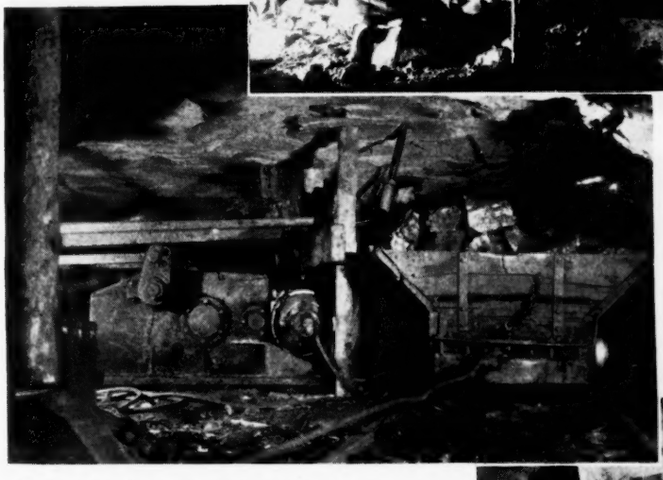
Face crews driving rooms consist of three men, all of whom are able to cut and drill. When the conveyor is used in narrow work, the face crew is reduced to two. This crew, plus a car trimmer who also acts as nipper and dumper, and the hoistman, comprise the entire production force for a shift. Cutting in conveyor places is done by a Jeffrey 35-B shortwall with 7-ft. bar. Both cutting machines are equipped with Bowdil chains and throwaway bits. A second post-mounted Dooley drill, using twisted augers and "Coalmaster" head and bits, accompanies the conveyor.

Drilling may precede cutting under certain conditions but normally follows it and is supplemented by careful bugdusting. Seven holes, drilled from three set-ups, are put in approximately as in Fig. 2, each hole starting about 6 in. down at the front and hitting the top at back to break the coal loose, as it tends to stick. Holes are loaded with Hercules "Red H C" sheathed explosive, approved this year by the Utah Industrial Commission for use on the working shift. Usually, 1½ sticks are loaded in each rib hole, with one stick in each of the other five holes. Thus, a 30-ft. place, making about 30 tons of coal when cut 6½ ft. deep, normally is shot with slightly less than 3 lb. of powder.



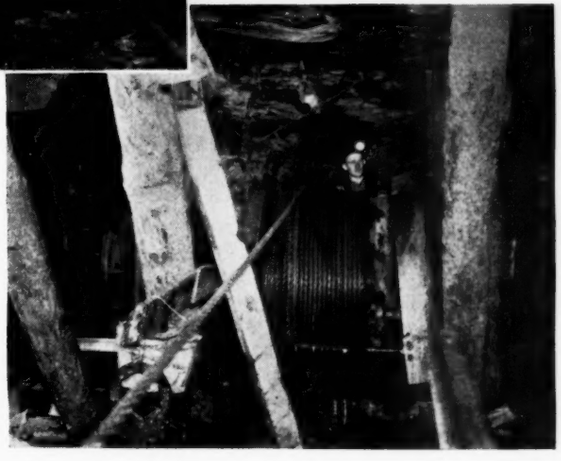
Above—Completing cutting and drilling in a narrow working place.

Upper Right—Mike Gambero, owner and manager, looks over a freshly shot fall of coal.



Above—Loading in a new narrow working place. As the conveyor still is short, it is supported on cross members. Later, chains and "monkey faces" will be used.

Above—Loading the first car in a trip of five. The top has been shot 2 ft. for height.



Right—All transportation at Lone Pine is handled by this electric hoist. The operator in this case is Richard Schultz.

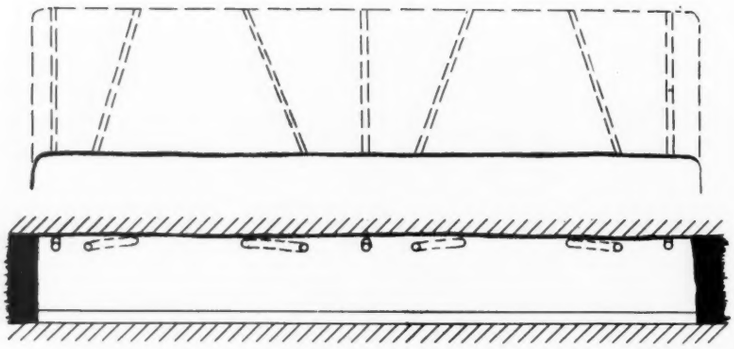


Fig. 2—Drilling pattern for 30-ft.-wide room.

With the preliminary face-preparation operations completed, the right half of the 30-ft. place is shot down and loaded, using the swivel to position the conveyor. This leaves the left half with an additional open face which, when shot, yields a large percentage of lump. As the left half is being loaded, the machineman, after setting bits, etc., if required, moves up and sumps. Then, while a loaded trip is being taken out, cutting is started, followed by drilling, bugdusting and the like. If cutting is not finished by the time other auxiliary operations, including putting on a new pan every other cut, are completed, it may be stopped and the right half of the place shot to permit loading to go on while cutting, drilling, etc., are completed. In other words, the cycle is continuous and, barring unexpected difficulties, a 3-man crew can average 1¾ to 2 cuts per 7-hour shift.

The preparation plant starts with a mine-run bin, from which the coal is conveyed to a shaker screen for separation into 1⅝-in. lump and 1⅝-in. screenings. Lump flows directly off the screen into the truck, while a belt conveyor takes screenings to a storage and loading bin, the excess going on over to a ground-storage pile. Coal may be oil-treated as it is loaded. Lone Pine coal is trucked 70 to 160 miles to Spanish Fork, Springville, Provo, Salt Lake City, Ogden and smaller intervening Utah communities. Many Idaho trucks also take on coal for the return haul.

Power to operate the mine is purchased at 11,000 volts from the Utah Power & Light Co. and comes in via a ½-mile pole line built by the coal company to three 15-kva. transformers, which reduce it to 220 volts. Face machinery is all flameproof. Ventilating air is supplied by a 4-ft. Buffalo Forge fan putting out 9,000 c.f.m.

# TWO 20-TON GUNBOATS

## Deliver All Coal Mined at Packer No. 4 To Belt Feeding Weston Breaker, Shenandoah

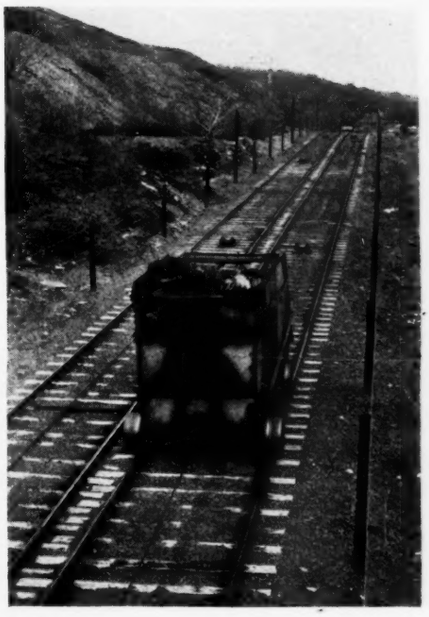
FOR THE OPERATION of the Locust Mountain Coal Co.'s mine and stripping, a big preparation plant known as the Weston Breaker was erected some years back at Shenandoah, Pa. Lack of coal caused its operations to be suspended, and the Locust Coal Co., practically the same Dodson financial interest, entertained and executed the plan of operating Packer Nos. 2, 3 and 4 mines of the Lehigh Valley Coal Co. (which also had been closed down), using the Weston Breaker as its cleaning plant.

To bridge the difference of elevation and the half mile or so of gap between the two, two 12-ton gunboats, skips or monitors, which had been operated on another incline, had their sides heightened and their wheelbases lengthened from 7 to 10 ft. at the company's shops so as to increase their capacity to 20 tons. The gage of the gunboat was not changed—78 in.

Coal is brought 900 ft. up the mine slope at Packer No. 4 by two similar skips, or gunboats, each carrying 11 tons, and is dumped into a 75-ton hopper at the top of the slope, from which it is discharged by electrically operated gates into one of two gunboats which are lowered alternately on separate tracks up and down the surface slope. The bottom plates of the hopper are heated by steam in the winter to prevent freezing of the coal or the sticking of the gates.

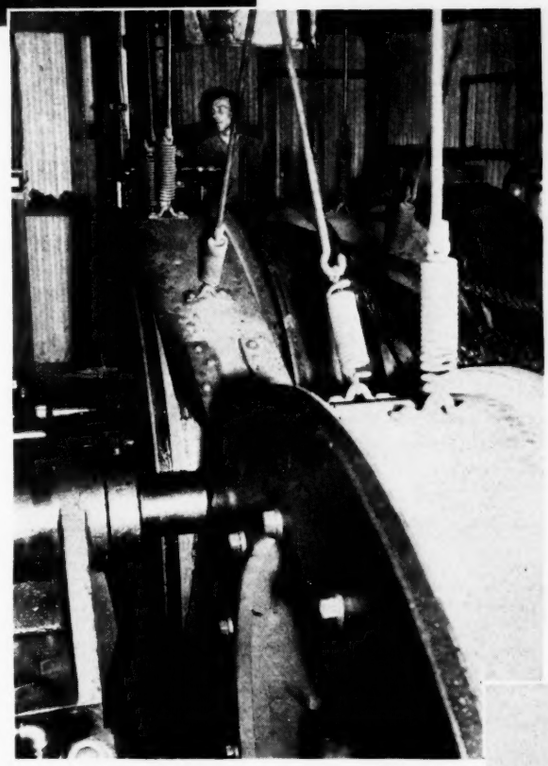
The surface slope is 2,300 ft. long, has two tracks, and a main-and-tail rope hoist. A 1¼-in. main rope passes from the upper end of one gunboat up the incline to the dumping station at its head. At this point, the rope is deflected about half a right angle to the hoist house, which has two friction drums around which the rope is passed five times. Thence the rope goes to the deflection sheaves and travels down to the upper end of the other gunboat. The lower ends of

Foot of plane with 20-ton gunboat commencing the ascent. Note careful fencing of plane and the overhead crossing by road and railroad.

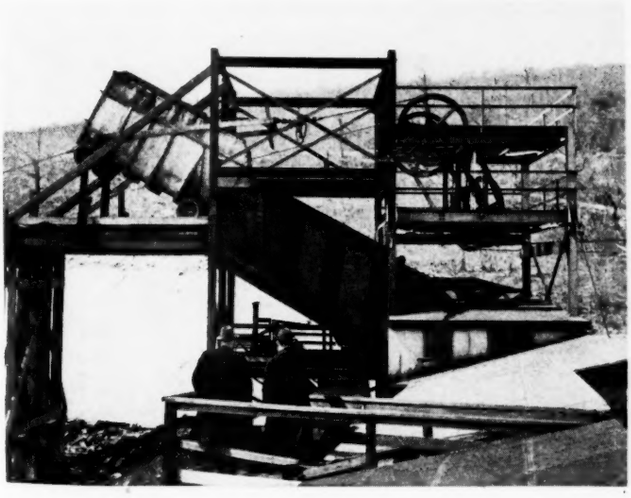


Gunboat ascending and, on left track, another gunboat just discernible descending. Rollers have ball bearings.

Hoist occupies the position it filled when it was used on an older slope running in a different direction. Rope passes five times round friction drums.



Where skips that have ascended the mine slope are dumped and the gunboats which travel on the surface slope are loaded. Hopper over loading point has 75-ton hopper, the bottom plates of which are heated by steam in winter.



Head of incline with deflecting sheaves which carry ropes to hoist on side hill.

both gunboats are connected by a 1-in. tail rope which passes around a take-up sheave 8 ft. in diameter at the foot of the incline. The two tracks are at exactly 8-ft. centers.

The ground rolls considerably along the line of the incline, and the rails are laid to conform with these gradients. Steel rollers with ball bearings are placed at irregular but appropriate intervals so as to keep the ropes from trailing over the ties, which are of 8x8-in. cross-section and 19½ ft. long. The rollers are 9 in. in diameter and 12 in. long and are fitted with ball bearings. No great length is necessary as the track is straight, and the rope merely rises and falls in a straight line when pulled by the hoist. Sixteen ties are set in every 30 ft. of distance. Head and tail sheaves have Timken roller bearings.

Because the loading point for the gunboats is almost level and the incline is steep near the top, the empty monitor, which weighs about 12,000 lb., descending the hill materially assists the hoist in starting the loaded monitor at the foot of the hill. The gunboats have Timken roller bearings on all four axles, and between journal boxes and car bodies are placed 1½x8x12-in. mats made of special rubber which cushion any irregularities in the track. In consequence, the gunboats make no observable noise in passing over the rail joints, though the rail ends are merely fishplated to each other. Sixty-pound rail is used.

One constant annoyance with a main-and-tail rope haulage is the necessity for frequent taking up of the slack in the long ropes as soon as it occurs. H. F. Brecker, mechanical engineer of the Dodson interests, has devised the idea of putting five long links on each end of the main rope where it is attached to the draft bridle. He uses this device not only on the surface slope but on the mine slope also.

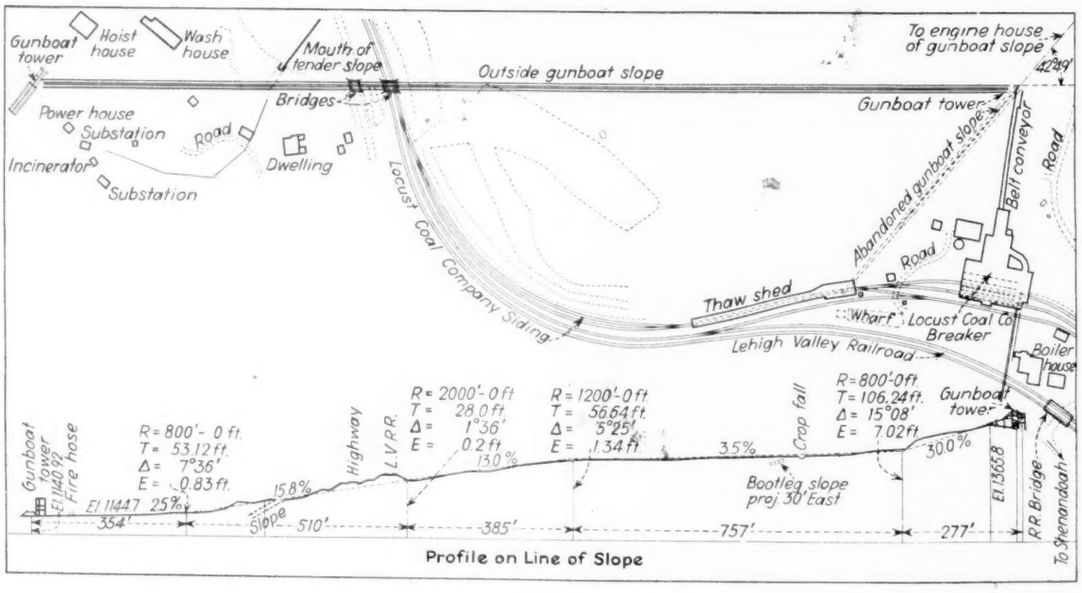
The length of these five links on the surface slope is 6 ft., so that by folding the links back one at a time and connecting with another link, the needed adjustments, up to 6 ft., at either end, can be made without rope splicing. After that length is exhausted, the rope can be cut and shortened 12 ft. and the full length of the links again utilized. The skips on the mine slope are lighter than the gunboats on the surface, but the steeper gradient overcomes that advantage, so the links underground are made of 2¼-in. material and those on the outside slope of only 1¾ in. The outside links are 15 in. long and those inside are 18 in.

To facilitate quick loading, only 20 net tons are loaded into the gunboats, which level-full would accommodate 27 tons. When making 175 trips per day of seven hours and loading 20 tons per trip, the two gunboats will deliver 3,500 net tons daily. However, the tonnages are based on the yield, and in heavily pitching seams such as this a large quantity of rock is hoisted with the coal.

Just at present, with an allocation of 1,690 tons per day, the surface slope is not taxed. About three tons per second can be loaded into the gunboats. One man at the top of the slope and another at the foot with a man at the hoist, handle the entire output from the mouth of the mine slope to the top of the breaker. This outside slope has been in operation since last September.

To prevent accidents, a staunch barbed-wire fence is erected on each side of the incline and a bridge has been built for the passage of a service road. The slope also passes under the Lehigh Valley R.R. With the ropes well underloaded and with heavy brakes on the hoist the safety of the incline is satisfactorily assured.

**A reopened mine had to be connected with a breaker near by which for some months had not been under operation. To this end, a double-track slope was constructed 2,300 ft. long with a 78-in. gage, and on it two gunboats on parallel tracks rising 212 ft. carry enough coal to produce, after cleaning, 1,675 net tons of commercial coal. The installation has a run-of-mine capacity conservatively estimated at 3,500 net tons per seven-hour day.**




Plan and elevation of the slope from Packer No. 4 to the road leading to Weston Breaker. Shows also breaker and old slope. Vertical-curve data will be found at each change of inclination on new slope.

# NORTH DAKOTA PLANT

## Carbonizes Lignite at Mine Mouth And Briquets Resultant Char for Shipment

**Before shipment, Dickinson lignite, when dried, will emit as water one-third of its substance. To remove this dead weight and to send a uniformly sized product to market and one practically indestructible except by combustion, the Lehigh Briquetting Co. heats the lignite in inert gas and passes it into a carbonizer, where a still greater heat converts it to a char which is briquetted with oil-refinery asphalt to which is added all the pitch from the process.**

By R. DAWSON HALL
Engineering Editor, *Coal Age*

WHEN stored, lignite will slack and deteriorate, and break into pieces of unequal size and shape, so that its combustion cannot be regulated as certainly as that of a fuel closely sized and uniformly shaped. Moreover, in burning, it does not give a highly radiant heat and, not being a concentrated fuel, gives only about 43 per cent as much heat per pound as coal of the highest rank. For these reasons, there has been demand for a good briquet that would not have these drawbacks.

In the heart of the deposit, the lignite found at Lehigh, Stark County, North Dakota, has about 40.3 per cent moisture, though as shipped it would run only 32 per cent or less, for the moisture is quite loosely held and begins to evaporate as soon as the coal is mined. But even 30 per cent of moisture is a burden in transportation. Percentage of volatile matter (which itself is largely converted to moisture in the furnace) is almost a third less than in some high-volatile Eastern coals, not so much because the lignite has less volatile matter as because it has a lower percentage when the moisture in the coal is considered. Remove the water until the lignite has the same moisture content as Eastern coals, and the volatile matter content will not be much different.

Freshly mined Lehigh lignite averages only 6.7 per cent of ash, including 0.78 per cent of sulphur, so the raw product is well suited for concentration by drying and devolatilization.

Coal comes from the mine shaft, located at the edge of the treatment plant, and falls into a 15-ton bin, from which it is fed by a reciprocating feeder to a crusher, which breaks it to 4-in. or less. This crusher is protected by a magnetic pulley that eliminates tramp iron. Lignite is extremely tough and difficult to break. An unusual crusher is provided, made by M. A. G. Breitfeld Danek & Co., Schlan, Bohemia. This has two rollers, one above the other. Both have eccentric fins which crush the coal, the upper one against a series of hawkbill steel points downwardly inclined and the lower one against a flat steel plate.

The crushed product is raised in a bucket elevator and passed over a vibrating Hum-mer screen; undersize goes to the power plant and oversize to the process. The screen usually has $\frac{5}{8}$-in. square openings, but the cloth can be changed to meet the needs of the power plant and to suit the size of the lignite arriving from the mine. Combustion of the undersize furnishes all power, heat and light at the operation for mine, carbonization, Cottrell and briquet plant.

Oversize from the screen goes into a Lurgi carbonizer. The basic idea of the carbonizer is to expose the coal to a circulation of gas at about 650 deg. C. (1,202 deg. F.) and to transfer this heat directly to the coal without the interposition of a wall. The retort has two parts: the first, or upper, part merely removes the 35 per cent of moisture in the lignite as delivered; the second, or lower, part, is a carbonizer.

To dry the lignite, gas from the latter, which has a fuel value of 350 B.t.u. per cubic foot, is mixed with air outside the dryer and burned. The inert mixture in the dryer is at a temperature of about 250 deg. C. (482 deg. F.). The coal disintegrates in the dryer so that a product of $\frac{1}{4}$ to $\frac{3}{4}$ in. is delivered to the carbonizer, gravitating through eight pipes, each about 16 in. in diameter and 60 in. long. These act as a seal between dryer and carbonizer. As the coal flows of itself between the two, the cost of handling coal from one to the other is eliminated, as also the cost of providing equipment for that purpose.

Because of the resistance of the pipes, with their filling of lignite, and the pressure of the gas in the dryer, which is kept always a few millimeters above the pressure in the carbonizer, the gas does not pass directly

from the carbonizer to the dryer, and there is no risk of spontaneous combustion in the latter. No valves or other obstructions interfere with the passage of the lignite through the pipes.

The temperature of the lignite in the dryer is much below that of the entering gases, because of the moisture that fuel contains. In fact, it does not exceed that of boiling water. The inert gases enter by four ducts in each retort, and there are two retorts. Nine ducts ranging in two rows in each retort void inert gas and water vapor.

Though the temperature is higher, for the coal has lost its tempering moisture, the carbonizer is run on the same principle as the dryer, with similar fan and ducts. As stated, the temperature of the entering gas is 1,300 deg. F., but the coal reaches a temperature of 1,100 deg. It gravitates to the bottom of the carbonizer, where it is cooled by entrant circulating gas, which is the same gas as used in the dryer, but this gas has not been burned; nor does it burn in the cooling section, for there is no air. The gas product is drawn off at the top of the carbonizing chamber, and the solid product (char or semi-coke) passes out by an air lock at the bottom.

To obtain uniform conditions it is necessary to distribute the coal evenly, and to this end, elaborate equipment is provided. As the mine runs only seven hours daily and the carbonizer runs 24, two 75-ton bins have been placed for storage of the raw product between the screen and the retorts, with a reciprocating feeder that delivers coal to the buckets of an elevator, which in turn fills a distributing car, itself provided with a suitable feeder. This distributing car delivers to points along and across the top of the retort.

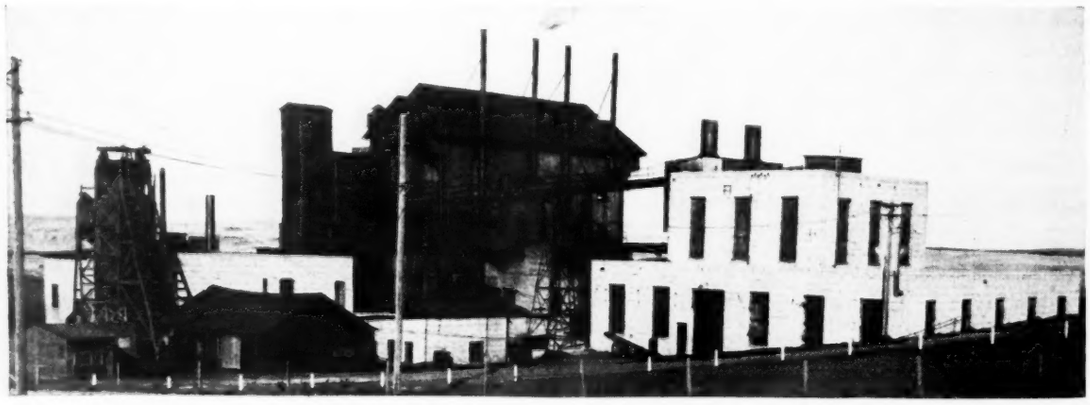
Char leaves the bottom of the carbonizing chamber cooled to about 200 deg. F. by the cool circulating gas, and does not tend to fire. It has from 8 to 10 per cent volatile matter. The Lurgi retorts are 85 ft. high and the treating chambers, or shafts, are about 20 ft. long and 6 ft. wide. Though explosions in the dryer do not occur, explosion doors are provided to protect the equipment against such an eventuality. Chromel-Alumel thermocouples are used in both dryer and carbonizer to ascertain temperatures. Each retort will carbonize 3 tons per hour, and so the capacity of the carbonizing plant is 6 tons hourly. The briquet machinery will make 18 tons of briquets per hour. In consequence, the briquetting plant runs one shift per day and the retorts three shifts.

In the briquetting plant, the char is passed over a 1¼-in. bar screen to remove the iron pyrite which does not disintegrate in the process of carbonization. The char then is crushed in a Williams hammer-mill down to about No. 6 screen, and all oversize is returned to the mill. All the material that passes the screen is used in the manufacture of briquets, being mixed with a binder of pitch or asphalt. The pitch is a product of the plant, and the asphalt is shipped from an oil refinery. In summer, a hard pitch is used, and in winter a softer mix. About 7 to 8 per cent of binder is provided, making a final product with about 15 per cent of volatile matter.

Binder is sprayed on the char in a mixing drum, to which it comes in a 2-in. pipe surrounded by one of 3 in. diameter. The latter acts as a jacket for steam. From the mixer it goes to the fluxer, or kneading machine. The briquets are formed under a heavy pressure in a Komarek-Greaves press. When newly made they are broken easily because a binder has to be provided sufficiently plastic that the mix will form readily in the short time it lies between the revolving molds. Because of their fragility when newly made, the briquets are transported on a wire-mesh screen to bins at a distance, thus permitting the exterior to cool and harden to such a degree that the briquets can be dropped on slatted wood bins for further cooling, which then is completed in the interior of the mass.

Char itself when burned will make no smoke, but, if insufficient heat is available when the binder is being consumed, a little smoke will be formed. Because of the uniformity of quality, size and shape of the briquets, the fire can be kept at a regulated temperature. Briquet samples are put every morning under a pressure of 475 lb. per briquet, and no failures occur. An abrasion test also is made. About 100 tons of briquets is obtained from every 250 tons of coal; some of the loss of weight is from the volatilization of moisture and volatile matter, but some is due to use of the coal in the power plant. The briquets are of the pillow type, 2⅛ in. square and 1 $\frac{5}{16}$ in. deep, and weigh 3½ oz.

On leaving the carbonizer, the temperature of the gases falls from 1,000 deg. F. to about 300 deg. and a mist of oily and tarry matters is formed, which liquids are separated by a Cottrell precipitator and later distilled to separate into two products. Creosote is recovered and sold for wood-preserving and disinfecting purposes, and the rest of the liquids are used in the manufacture of briquets. In general, one-third of the binder used is pitch from the plant and two-thirds is asphalt. The plant is operated by the Lehigh Briquetting Co., which is owned by some 7,000 people, mostly residents of North Dakota.



Mine, char and briquet plant of Lehigh Briquetting Co., Dickinson, N. D. Headframe of mine shaft on left, Lurgi carbonizers in center, shop to right, with briquet plant appearing over the top of shop.

# HOW WATER BREAKS

## In Wabash River Valley Operations Are Checked and Sealed Off at Saxton Mine

MINES operating under the Wabash River Valley in the Clinton-Terre Haute section of Indiana include the Saxton Coal Mining Co., in the outskirts of Terre Haute. As the Wabash runs in a sand-and-gravel bed, which naturally is full of water up to river level at all times, mining operations necessarily must be conducted with care and the management must be prepared to handle the occasional unexpected break into the gravel, with its attendant influx of water. Such a break occurred at Saxton during the morning of Dec. 14, 1939, but, despite an inflow of water estimated at 2,000 g.p.m., was successfully caught and now is sealed off by permanent plug-type bulkheads.

Cover at Saxton ranges from 200 to 240 ft. in thickness, which includes 20 to 110 ft. of hard shale over the seam, the remainder naturally being made up of water-bearing sand and gravel. No mining is done where the solid top is less than 25 ft. thick, however, and to ascertain definitely what the thickness is running a Sullivan portable diamond core drill is employed, working from inside the mine. The panel system of mining is used—i.e., a group of rooms is surrounded by an unbroken pillar except for the necessary headings at one end. Pillars are left in place and the practice is to place bulkheads in the panel headings as soon as the rooms are worked out. Thus, the mine is protected against breaks in old working sections.

In active sections, however, reliance is placed on the core drill and on an organization experienced in handling breaks, a number of which have occurred in the history of the operation. The break with which this article deals took place about 6:45 a.m. At least, electricians who had gone in to move a loading machine at about that time had seen no water but found it on the road on the way out around 20 minutes later. The break occurred in a crosscut between Rooms 2 and 3 off 2d South panel heading off the regular 16th East panel heading off 2d North entry (Fig. 1). In other words, it occurred in a subsidiary panel turned off a regular room panel.

The break apparently went clear to the surface all at once, and when discovered water was running down both 1st and 2d South headings (each about 12 ft. wide) about 18 in. deep. Thickness of the solid strata at the drillhole nearest break was 29 ft.

Dip of the measures is north in this particular section and consequently the water ran out of 1st and 2d South onto the 16th East panel heading, which runs east and west. There-

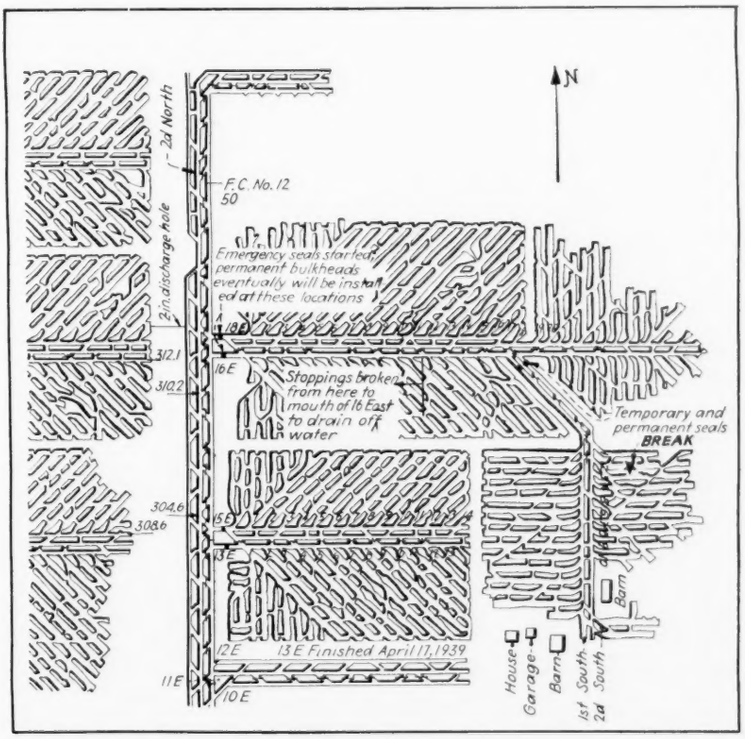
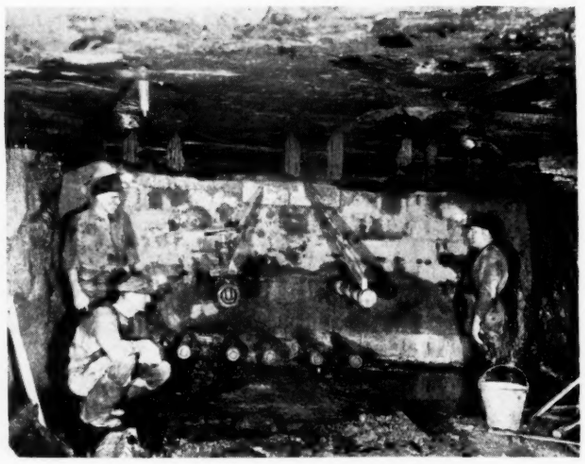



Fig. 1—With the break occurring off 2d South temporary seals were put in at the mouths of both 1st and 2d South. These then were backed up by permanent bulkheads. Preparations for emergency seals also were made at the mouths of 16th and 18th East.

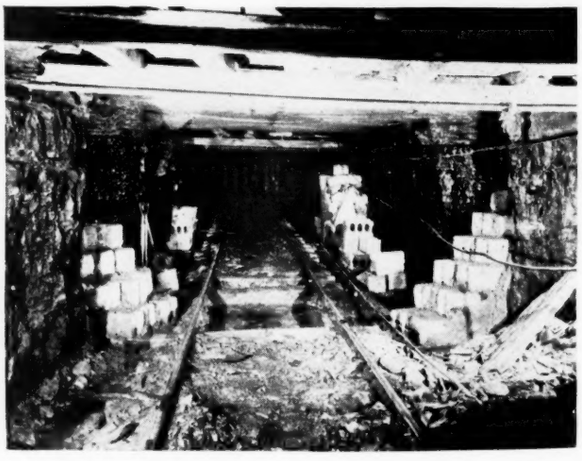


Left—How the break looked on the surface. Right—Here the temporary seal in 1st South has just been completed and hitches for the permanent bulkhead are being prepared.

fore, the first step in controlling the flood was to knock holes in the seals along 16th East as indicated in Fig. 1 and bleed the water off into the rooms off 18th East. Two 1,000-g.p.m. pumps were set at the mouth of 18th East to move water from these rooms around through the bulkheads into 13th-15th East panel. Incidentally, it might be noted here that all bulkheads put in to seal off panels at Saxton are equipped with pipes and valves so that water either may be pumped in or out as desired.

With the water diverted into the rooms off 18th East, temporary seals were placed in the mouths of 1st and 2d South. To prepare for these seals, the bottom was cleared off and evened up as much as possible in view of the running water, and hitches about 2 ft. deep were cut in each rib. A gob dam was thrown up behind the seal location and concrete blocks for a seal 7 ft. thick were laid on the bottom. Five 3-in. pipes were placed in the first course of blocks to carry off such water as got through the gob dam. Then, the seal was built on up to the roof, in the course of which two 4-in. bleeder pipes with valves were installed as shown in an accompanying illustration. The 3-in. pipes in the bottom were closed with screw plugs. Both temporary seals were completed by Saturday evening and proved to be practically water- and air-tight. In the meantime, hitches were cut and emergency seals (see accompanying illustration) were started at the mouths of 16th and 18th East for use in case trouble was encountered at the original location. Regular plug-type bulkheads will be installed at these locations when the 16th-18th East panel is worked out.

With the temporary seals in place in 1st and 2d South, plug-type permanent bulkheads of concrete were installed. For these bulkheads, hitches were cut in both ribs and in the top and bottom. In cutting these hitches they were tapered from the back to the front, thus making the seal larger on the side next to the water so that pressure tends to wedge it tighter in the hitches, like forcing a tapered cork into a jug. These permanent concrete seals were made 4 ft. thick. The back form in each case was the face of the temporary seal, while the front form was made of shiplap held in place by three rails, as shown in an accompanying illustration. When the bulkheads had set, these rails were removed and the form was taken down. Bleeder pipes were left in each bulkhead in accordance with usual Saxton practice.



Left—Front forms for bulkheads are supported by three rails, as shown in this view in the 2d South heading. Right—Hitches were cut and emergency seals were started in 16th and 18th East in case trouble was encountered in 1st and 2d South.

[ THIRD ARTICLE OF A SERIES ON VENTILATION FOR FOREMEN AND OTHERS ]

# GETTING ALL THE FAN'S AIR

## To Working Face Without Leakage; Air and Water Problems Are Closely Related

MINE DRAINAGE raises many problems in the operation of the ventilating system because it furnishes opportunities for waste of air and because also the water, by freezing, reduces the ventilating cross-sectional area, sometimes most materially. Again, in winter, freezing always is the outcome of ventilation. Hence, the two problems are inextricably bound together.

As the fan is the source of the differences in pressure of the air by which ventilation is provided, it is near the fan that leakage is most active, as was explained in the first article of this series (November, 1939, p. 52), and it is at the fan end of the "air travel" that most careful investigation for leakage needs to be made.

One place where air from the surface is able to enter the ventilation stream and pass to the fan without passing to the mine face, or making any real start in that direction, is through the outer end of the drainage system, but this it can do only if that water system leaves the mine near the fan end or furnace end of the air travel. Where air is being forced into the mine by a fan (see Fig. 1), it is doubly important that there be no leakage through and around the drainage system because not only is air wasted but the cold air from the fan travels only perhaps a few feet in the mine and does not get warm before it discovers opportunity for escape and starts back through and around the pipe or pipes of that drainage system.

This air in the winter may be so cold that it will freeze the water from the inside of the mine out and may block the passage, a result likely to be more harmful in the winter from a drainage standpoint than it will be in the summer from the leakage of air. A freeze-up of the drainage system will result in flooding, followed by freezing, and the digging out of this large body of ice. Hence, such leakage must not be allowed to occur.

**Beware of recirculation of surface air through and around water boxes and pipes. This air loss, which occurs only at the fan end of the air travel, is objectionable also because it may freeze drainage water in wintry weather. To prevent this, it might be well also to have the drainage system follow the return air near the surface. Some doors must be made tight and some can be allowed to leak. Article explains how doors may be prevented from leaking.**

Again if the air is "pulled" from the mine by a suction fan (see Fig. 2), the lower pressure of air behind the fan may be discovered by the outside air, which will enter the mine through or around the drainage system if its entrance is not prevented. Not only will this give the ventilating unit more work to do without compensating advantage but in winter it may freeze the water. So care is needed, whatever kind of fan is installed.

Fortunately, perhaps, it is customary to locate the drainage system on the haulage road and not on the airway, so trouble from this type of recirculation is not frequent except where fans are placed later at a secondary opening, often far from the main portal, to get the benefit, at least to some extent, of a unidirectional air system. There it may well happen that drainage will be provided to the surface, and such drainage may cause air leakage and, in the winter, frozen pipes, with all their distressing results.

Here it seems well to consider whether fear of leakage should cause a continuance of the present practice of putting water system—ditch or pipe—on the haulageway, where it interferes with permanence of road, causing heaving and the erosion of ballast, with occasional undesirable electrolysis but where the main and recognized advantage is that detritus can be removed without difficulty.

If the airway is a return, it is for at least the last 1,000 ft. of the water system, where frost is troublesome, a much better place for passage of water than the roadway, as the mine water then will not freeze in winter.

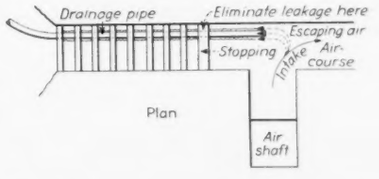



**Fig. 1—Force fan pushing air into mine and out to surface through and along drainage pipe. Stopping should be not at mouth of mine but much further in, for drift may leak.**

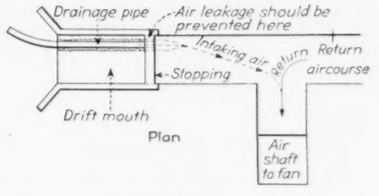
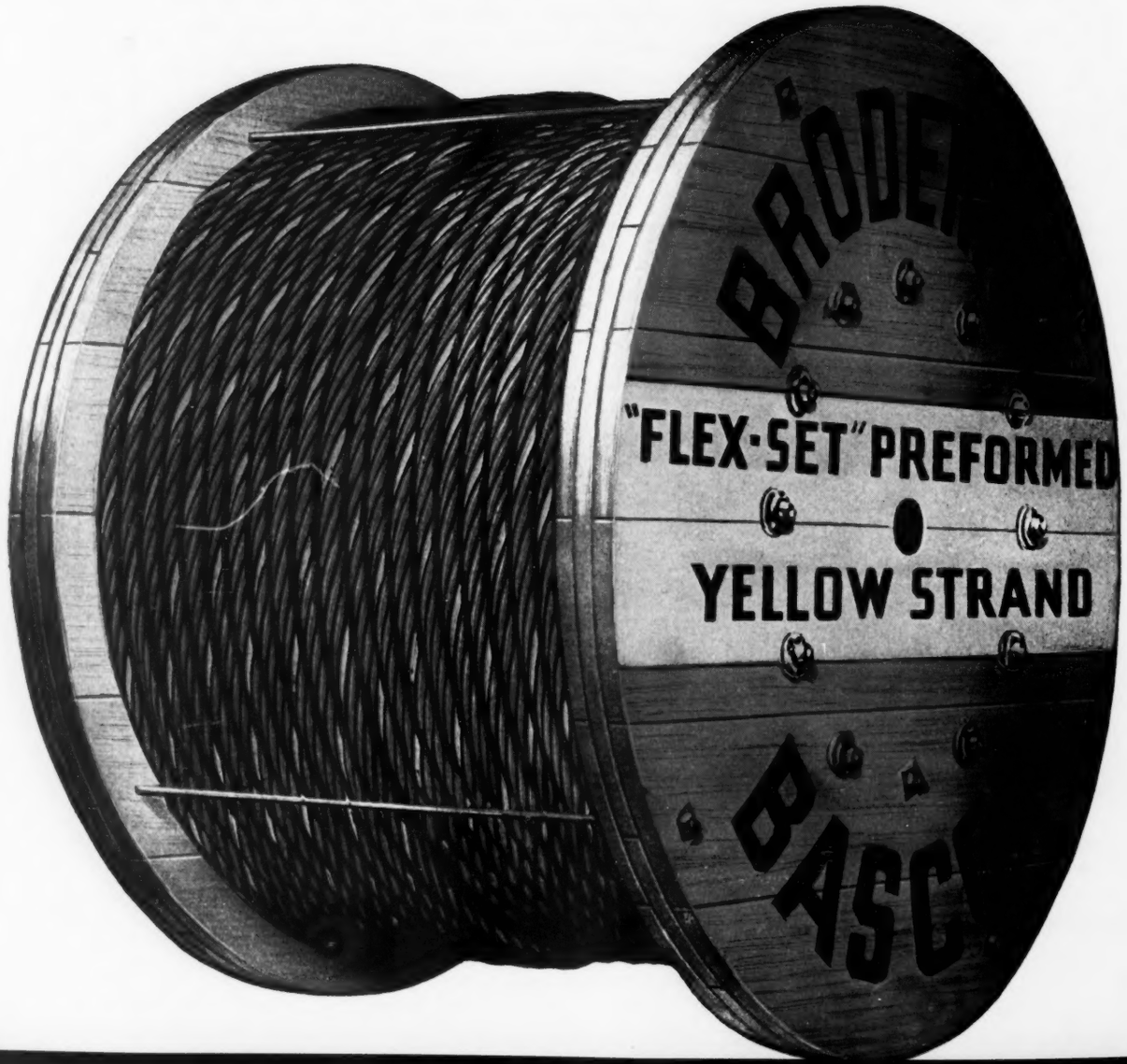



**Fig. 2—Suction fan drawing air into mines and up shaft and also through or around drainage pipe.**

# "FLEX-SET"

# YELLOW



# PREFORMED

# STRAND

Miners everywhere profit by the economically long life of this super-rope; its ease of handling; its wonderful resistance to kinking, metal fatigue and drum crushing.

There's a distributor in every field. Get in touch with him and save cable money.

**Broderick & Bascom Rope Co., St. Louis**

**Factories: St. Louis • Seattle • Peoria.**
**Branches: New York • Chicago • Seattle • Portland • Houston.**

Y-2

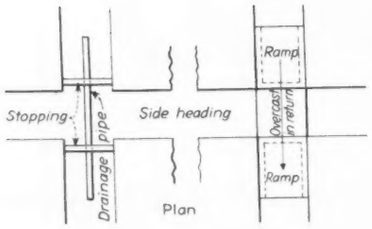



Fig. 3—Drainage pipe can cross side headings by using one of the return headings if duly protected from leakage of air by stoppings on either flank of the side heading.

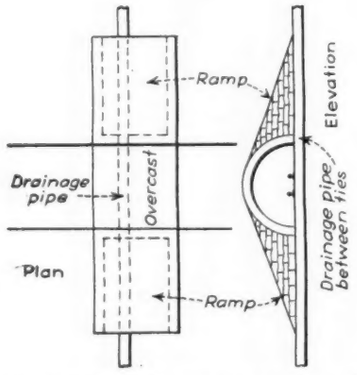



Fig. 4—Where the return headings each have an overcast or are combined by suitable diagonal connections, the drainage pipe readily can be laid under an overcast.

The water can be carried out in a pipe which can be trapped adequately at the surface, and by taking due precautions air can be prevented from passing around the outside of the pipe, freezing its contents and entering the fan. When the airway is a return and the mine is fairly level, perhaps the airway is the place where the water system should be located. With light rail being discarded for heavy, tracks of this rail could be laid in the return airway for the removal of falling rock.

The arrangement presupposes 1,000 ft. of straightaway without an overcast along the airway, and sometimes such a run is not available. However, even where there are two returns, one might be used for water or, where only one heading is present, the water system might be laid under the overcast or overcasts; that water system, where crossing the side headings, could be buried beneath the floor and carefully protected against the short-circuiting of air.

In winter, water leaving the mines, being relatively warm, dampens the air and prevents drying of the workings; hence, there is some advantage in letting the mine water travel in the intake. In summer, the mine water is relatively cold, and if it comes out in the air intake it will cool the incoming air rapidly and cause an immediate loss of moisture in the air, so that a less extended length of road will have to be protected against falls than if the water were absent.

These two seem to be about the only conditions favoring the bringing of water out on the intake, and they are hardly adequate to justify its choice as the end of the drainage system, though in regard to the first it should be said that mines get desperately dry in the winter and steaming mine water at about 60 deg. F.—

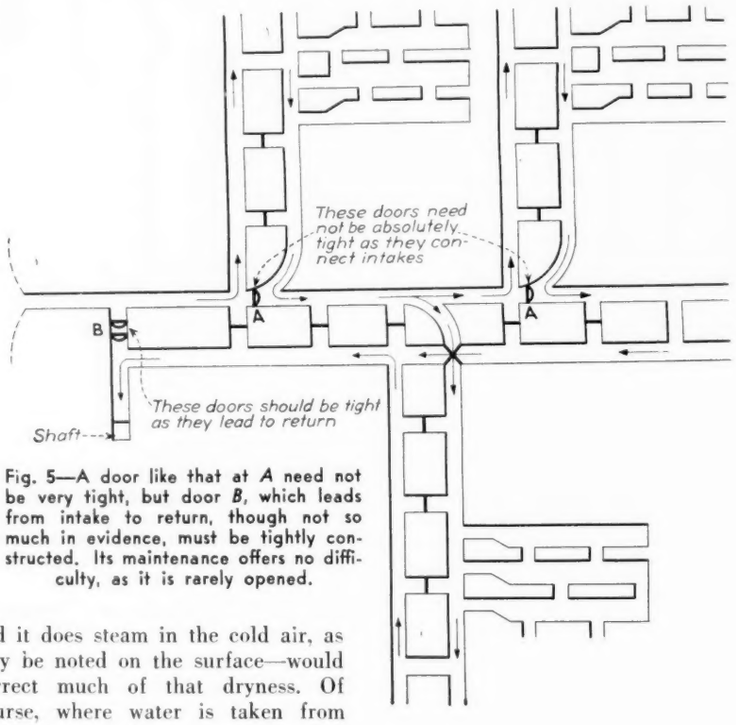



Fig. 5—A door like that at *A* need not be very tight, but door *B*, which leads from intake to return, though not so much in evidence, must be tightly constructed. Its maintenance offers no difficulty, as it is rarely opened.

and it does steam in the cold air, as may be noted on the surface—would correct much of that dryness. Of course, where water is taken from the haulway to the return airway, protection must be provided against leakage. Where the haulway is the return, there will be no difficulties from freezing, and the water system can remain in the roadway.

Water pipes can be trapped at the surface by providing for the liberation of their discharge under water. With that provision made, the only leakage will be around them, and careful concreting will prevent even that almost completely.

Doors are sources of loss of air and also a serious menace to life because they may be thrown back or even latched or propped open. As doors on the main heading between the intake and return of a cross entry are likely to be left open, thus short-circuiting the air to the headings of that entry, it is well to give each entry a separate current and split the air if under this arrangement a sufficient volume of air to scavenge the several entries can be provided. Moreover, it is bad practice to require the men in any entry to work in the foul, or even methanous, air from workings in another entry. Provisions in the laws, however, usually so limit the number permitted to work in any split that such questionable economies as this rarely can be attempted.

If, for lack of air volume, splits for each entry cannot be arranged, it would be well to reduce the number of entries to be ventilated, increasing the coal output of each entry so as to maintain tonnage. If that provision does not suffice to provide the needed air, either better or more airways or a fan of larger capacity would be desirable. Probably the last resource of all is to use the form of ventilation requiring doors and known as "continuous ventilation," in which the air passes through the workings of one entry and then on to the next, so as to get a scouring circuit in each entry. As a rule, such a method of working is adopted not so much for scavenging as to avoid the building of an overcast, which is an extremely weak reason.

Moreover, it so adds resistance to the fan by increasing the distance the air has to travel that it is doubtful whether in any case the quantity of air at the face of any entry or entries actually will be increased by the use of the same current in two entries in

turn. Eventually, if the entries are advancing, the improvement in the airways or a larger fan will be needed and then the overcast will have to be built, so the economies will be illusory, and if methane is generated in the mine the results of the delay in rearrangement may be fatal unless the entry to be thus ventilated is a mere stub and has only a short life.

However, if a door is placed between the two headings, it may not be necessary to make it absolutely tight, for any air that passes through it merely will go further into the mine where it will be used. Not much air will pass from intake to intake, and what does will still go to the face of the workings, though it will not go to some of the workings to which it would go if the door were airtight. Unless the entry thus short-circuited by the air has not enough air for ventilation, the abstraction of this portion of the air from its circulation by leakage through the door will do no harm; in some cases it might actually be helpful. In fact, the door may be regarded in a sense as a regulator rather than as a door. Of course, it must be kept closed, as, when open, the circuit will be entirely deprived of air current (see Fig. 5).

### Doors Should Be in Pairs

In circulatory ventilation doors, however, between the intake and return must be tight. All doors should, if possible, be in pairs so that if one comes to grief, there will still be another to perform the needed work, though not so efficiently as two. It is well to have a spare door ready for erection and available at each pair of doors, especially in gassy mines.

To make doors tight they should be made substantial so that they will not warp, and they should be hung so that force will have to be used to open them and so that the pressure of the air will tend to hold the door tight when closed. Between the track should be placed a door sill of the height of the rail about 1 ft. wide in the direction of the track and long enough between the tracks that only sufficient space will be left between the rails and the door sill for the flanges on the car wheels (see Fig. 6).

This sill should have sloped approaches up and down the track for a distance of about 3 ft. in either direction so that no one will trip over it. On either side of the track the same provision could be made except that these extensions of the sills should reach the rail. Also, the track ties should be long enough to provide for the support and attachment of these side extensions.

With this arrangement, persons traveling along the track will not stumble, and yet the escape of air under the door will be prevented, provided a strip of rubber that will scrape the floor is nailed along the entire length of the bottom of the door. The sill always should be kept free of coal. Flat rubber or, better yet, rubber constructed like an outer automobile tire that will have a cushioning effect should be placed along one jamb and along the lintel on top of the doorway. Against these rubbers, the door will be gently cushioned.

A sheet of rubber should be put on the hinge side of the door, extending beyond it so as to cover the crack between the door and the jamb. It should be so light as to bend under the pressure of the air and thus lie like a plaster over the crack. The hinges should be heavy and should stand out from the main casing as far as the rest of the door when cushioned on jamb and lintel rubbers. A porcelain insulator should be placed above and at the sides of the trolley wire, which latter should not pass through the door but above it. Doors near the fan between intake and return always should be in pairs and well built, even if not much used, and where not intended for admitting cars should be made only wide enough for admission of men. If intended for locomotives or cars, they should not be wide enough to allow space for passing persons on either side unless the door is intended to pass trips.

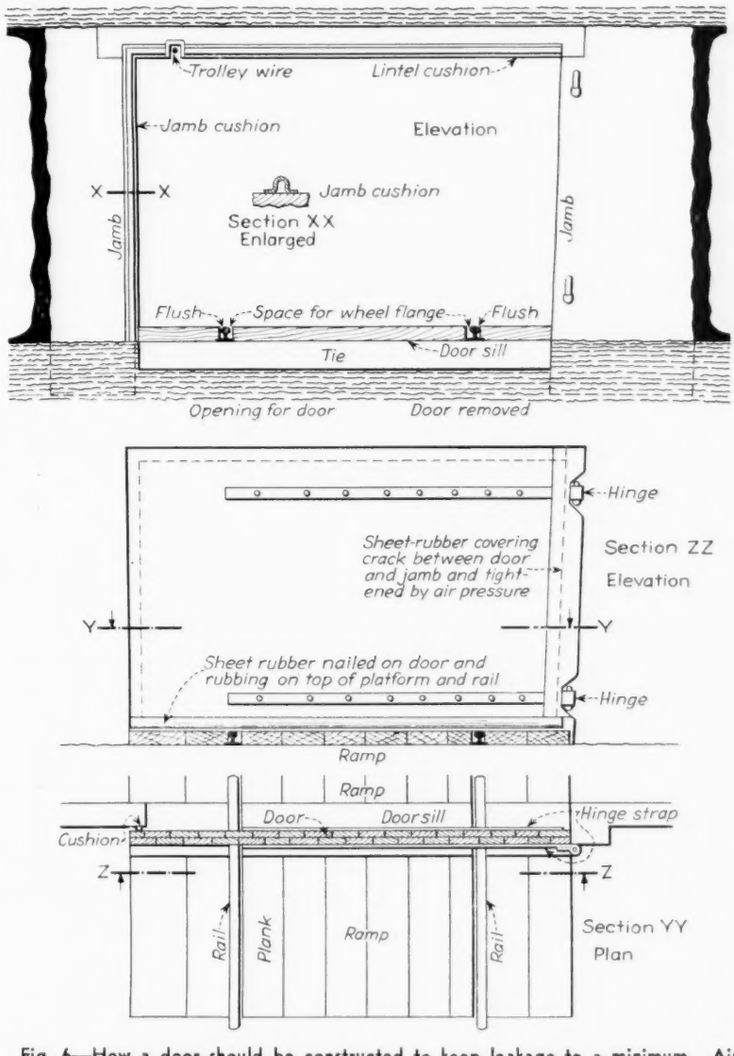



**Fig. 6—How a door should be constructed to keep leakage to a minimum. Air is saved and safety assured by use of two doors and by locking the men through smaller side doors, just as to save water, small boats on a canal are often locked through a small lock to the side of the larger one which is used by the big boats.**

# WHAT'S NEW ACROSS THE SEA

EFFORTS are being made in Great Britain to reduce mine-support wastes, for much of the timber used, and most of the best of it, has come from the countries fringing the Baltic. From these efforts may evolve some new conservational methods. In a sense Great Britain has always been more economical than this country in its use of timber. Though far more of it is stood in place than in this country, a larger percentage is withdrawn and used over.

A. M. Bryan, M. A. Hogan and J. A. S. Ritson, in a paper presented before the Institution of Mining Engineers, recommended that timber props less than 4 ft. in length be standardized in steps of 3 in., and those over 4 ft. in steps of 6 in. One wonders if that really would result in economy. A similar standardization of the length of steel supports is advocated, which is more reasonable where steel posts are extensible.

These authorities declare that some companies have appointed salvage corps to travel through the mines and to recover all timber for which no need can be shown in its present location. They point out that the wrong choice of a mining method may necessitate the use of an excessive quantity of timber, that the lack of roof control may result in excessive breakage, that inadequate size of supports, spans too wide between them, improper setting of supports —as, for example, without caps—failure to extract the timber at the right time, its withdrawal with the wrong tools—such as an ax—by the wrong system or no system whatsoever may waste timber. Other possibilities of economy are: keeping props clear of shaking chutes, ropes and mine cars, by which they may be mutilated, and by improving the condition of the air and thus lessening timber rot and fungal growths.

Some methods of working, declare Messrs. Bryan, Hogan and Ritson, consume more timber than others and may have to be displaced. It may be necessary to change from room-and-pillar to longwall methods of working, to depillar by longwall methods, to work on retreat instead of on advance or to employ mechanical aids to speed extraction and to get larger outputs from smaller areas.

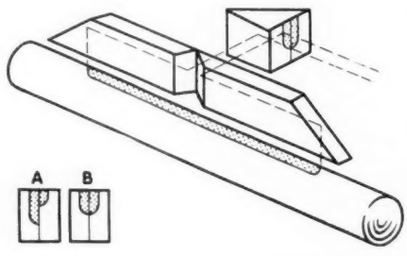
Packs should be advanced as near the working face as possible, so that the timber can be used again and again with minimum loss and delay and can be more readily dislodged. In general, each set of conditions demands a certain sequence in operations which, once determined, should be strictly followed. Proper release devices for timber should be provided.

Timber props must be regarded as rigid supports and, unless a compressible cap or a soft floor affords some relief, other means of providing for roof movement must be devised. Such a relief is tapering the ends of props. After the prop is removed, the burred ends can be sawed off, and the props used in a thinner seam. Incidentally, it may be said that in Great Britain, where more seams are worked than in our own bituminous areas, it is as easy as in our anthracite seams to find a place for props of several sizes. In the anthracite region, however, prop recovery, unfortunately, is illegal. Where timbers are subject to rot, the three authors say, they should be subjected to preservative treatment.

If bark is left on after a tree is felled, the seasoning of the timber is delayed or prevented, and fungal decay will start from its underside. Because seasoned Baltic props with bark removed are stronger and lighter than British props, a ton of the former will carry as much as 2.88 tons of the latter.

Before the war, the average life of a timber prop was three or four days. Steel props should certainly last as many months, and it is estimated that, assuming three days as the life of a wood prop and a loss of 2 per cent per week in steel, an annual consumption of 500,000 tons of timber in the form of 4-ft. props could be replaced by 16,000 tons of steel for the initial changeover, with the addition of the same quantity of steel annually thereafter to replace wastage.

PROGRESS in design of surveying instruments is being made in Great Britain, where an internal focussing telescope has been developed. This has a fixed length of only 7 in. and, because in the process of focussing the inner cylinder does not slide in or out, dust and damp are excluded from the interior, declares Dr. R. McAdam in the *Colliery Guardian*. As the length of the telescope never changes and as the light-weight focussing lens is near the instrument center, short sights do not disturb the balance of the telescope and any focussing collimation error is avoided. Under such conditions errors of 20 sec. were not uncommon, it is said, with the older types of telescope.




Coincidence level reader—light from both ends of level bubble enters glass prisms and is refracted to show the relative positions of the bubble extremities. On the lower left at *A* the combined image shows that the bubble is not in proper position; the right rim must be lowered until it reaches position *B*.

With the 14-in. telescope, which projected over the tripod, one always was afraid that the telescope would be damaged or strained, especially when the instrument was being carried in a low heading or room. The tacheometric stadia constant of the new instrument also is negligible, but around the mines in this country measurement of distance by readings on a leveling rod by transit or level is almost a forgotten practice. Much of its short-lived popularity was destroyed by the proneness of the ends of the legs of the instrument to sink or rise when readings were being made.

A higher degree of magnification also is claimed for the new instruments. On the other hand, an extra lens is needed, and some light thereby is lost, which, however, is compensated by using a larger glass at the object end of the telescope. With changes in temperature and humidity, moisture condenses on the interior glass surface and dims the view, but, with the Stanley India level, a removable dustproof cap permits access through the top of the telescope to the internal focussing lens; thus moisture can be removed. Here it may be interjected that washing a lens with soap makes it less disposed to fog and removes the grease that hands will convey to its surface.

In the Watts microptic theodolite (a transit with a long telescope that will plunge but is too long to revolve through a 180-deg. vertical angle), hygroscopic crystals in a removable receptacle are attached to the instrument. Dr. McAdam suggests the use of silica gel for this purpose.

A device known as the "coincidence level reader," or, as we would say, "finder," has been devised by which images of the two ends of the long level bubble are refracted to a common point and, by comparing the relative positions of these images, the divergence of the bubble from true centrality becomes apparent. Errors of parallax are eliminated, and the setting is said to be four times as accurate as when performed by direct observation of the two ends of the bubble.

With this attachment, one need not change one's position to determine the correctness with which, when taking a sight, the instrument is leveled. However, in leveling, one always is obliged to move around the instrument and, if the legs are not firmly embedded in the ground, the correctness of the work will be destroyed, so the benefit of not having to move around the instrument is lost.

It would be better perhaps to execute a war dance around it before taking measurements, thus developing all the insufficiencies of support; then the instrument could be releveled and the sights taken with somewhat greater assurance. But buried limbs and roots of trees are sure to spring up whenever the weight of one's body is shifted; bogs will ooze out of place when the leveler moves and frost will leave the ground or enter it, so assurance can be obtained only by placing the instrument as a momentary templet, driving stakes firmly and deeply

where the feet of the tripod legs are temporarily placed and then setting the instrument on the stake tops.

So set, one can work around an instrument by the hour with assurance, and then the coincidence level finder will give the leveler further confidence that his setting is correct. This device is being used in this country by the Coast and Geodetic Survey.

R. Dawson Hall

# WHAT'S NEW ON THE BOOK SHELF

*Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Where no price is appended in the notice of a publication of the U. S. Bureau of Mines, application should be directed to that Bureau. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case are in the review notice.*

Friability, Slacking Characteristics, and Low-Temperature Carbonization Assays of Sub-Bituminous Coals of the Denver (Colo.) Region, by V. F. Parry and J. B. Goodman. U. S. Bureau of Mines R. I. 3457. 15 pp., mimeograph.

In this area, the coals are Sub-Bituminous B and C and "are considered relatively smokeless in most forms of combustion equipment." Carbonization has been suggested by some persons as a means to rid the fuels of water and oxygen and thus improve their other characteristics. The four "B" coals when carbonized at 550 deg. C. produced 53.3 to 58.0 per cent of their weight in char and the one C coal had a 52.2 per cent recovery at 700 deg. C. The three figures quoted for 550 deg. C. were always smaller—47.4 to 52.3 for the B coal and 50.4 for the C coal respectively.

At the lower temperature of carbonization, the gas generated has 24.5 to 33.3 per cent and 24.8 per cent of carbonic acid respectively. The figures fall to 13.7 to 19.6 and 24.8 respectively at the higher temperature. Instead of the gas having a heat value of 750 B.t.u. per cubic foot, as has a gas made at such a temperature from a high-rank coal, the values are 505.9 to 623 and 482 B.t.u. respectively with 550-deg. C. carbonization. Slacking and friability indexes for the coal of the area are given in the bulletin as well as tars and light oils produced during carbonization.

•

Notes on Large-Scale Tests of the Explosibility of Coal Dusts Made in the United States and Great Britain, by H. P. Greenwald. U. S. Bureau of Mines. R. I. 3462. 13 pp., mimeograph.

In determining the proportion of incombustible material to be mixed with coal dust to prevent flame propagation, size and composition of coal dust, quantity of coal dust present and effect of flammable gas in the air current have received most attention as variable factors affecting the result. Strength of source of ignition, which probably has been studied more seriously in the United States than elsewhere, is, Dr. Greenwald declares, of major importance.

Other relatively neglected factors are manner of distribution of dust and cross-section and configuration of gallery in which tests are made. Until these three last factors have been investigated fully, results in one country cannot be compared with those made in another. Studies showed that there was an optimum concentration of dust or, in other words, a quantity of dust per square foot of cross-section such that if any more or any less dust were present, the explosion would be less violent.

•

Physical and Chemical Properties of Cokes Made or Used in Washington, by H. F. Yancey, R. E. Zane, R. W. Fatzinger, and J. A. Key. U. S. Bureau of Mines, Technical Paper 597, 44 pp.: paper. Price, 10c.

Comparative information on the properties of Washington coke as evaluated by standard tests now used in the industry, both physical and chemical, is detailed in this report. Should the coke consumption by electrothermal and electrometallurgical industries increase as a result of surplus electric power in the State, say the authors, definite, authoritative information on the properties of coke from Washington coals would be desirable. Conclusions embodied in the report are based on the examination of 21 coke samples (fourteen from Washington, three from British Columbia, and one each from Utah, Pennsylvania, England and Germany) produced on an industrial scale by commercial processes.

•

Safety Provisions for Underground Work in Coal Mines: Report to the Preparatory Technical Conference, Geneva, October, 1939. Vol. I—National Legislation. International Labor Office, 734 Jackson Place, Washington, D. C. 444 pp., 6¼ x 9½ in.: paper. Price, $2.

In this volume the mining regulations of Belgium, France, Great Britain, Netherlands, South Africa, Union of Soviet Socialist Republics and the United States of America are brought together. To facilitate comparison, material in this regard has been grouped by subjects in 23 sections, as, for example, shotfiring and supports. Accident statistics also are covered, State inspection and, in countries where it applies, workmen's inspectors. There also is a review of safety work by government departments, research bodies and safety associations; also one or two examples of the safety organizations of individual operations in some of the several countries. Vol. II of this publication has been prepared solely for the conference and is not on sale.

•

Heat Liberated in the Low-Temperature Oxidation of Anthracite, by G. S. Scott, U. S. Bureau of Mines. I. C. 7053, 10 pp.: mimeograph.

Though the heat liberated per centimeter of oxygen consumed by anthracite at temperatures of oxidation ranging from 150 to 400 deg. C. range from 3.23 to 6.50 calories, all the values found on test at oxidation temperatures of 350 and 400 deg. C. lie close to the average range of 4.00 to 4.25 calories.

•

Cooling Mine Air During Summer Months to Prevent Roof Falls, by C. A. Herbert, U. S. Bureau of Mines, I.C. 7098, 18 pp.

As the title suggests, the author is opposed to the argument that roof failure during the summer arises from "sweating," or the deposition of water by the air current, and believes that it is the variation in temperature, not the humidity, that causes the trouble. With this conclusion, many will take issue, but, as Mr. Herbert terms it "an opinion", there is no occasion for dogmatism. After all, roof decay probably is due in part to four physical causes: humidity, variation in temperature, high temperature and frost. It is regrettable that Mr. Herbert has not seen fit to dilate on his reasons for believing that it is not humidity that causes the roof falls. Installations in five mines are described.—R.D.H.

•

Greenbrier County, by Paul H. Price and E. T. Heck, West Virginia Geological Survey. 846 pp., 6 x 9¼ in., with topographic and geologic maps in box.

Beginning with historical material and data on industrial development, this volume in turn covers physiography, geology, structure, stratigraphy, mineral resources, paleontology and levels of Greenbrier County, which comprises in the main the headwaters of the Greenbrier River and contains the mining towns of Leslie, Crichton, Anjean, Quinwood, Marfrance, Clearco, Duo and Charmco.

•

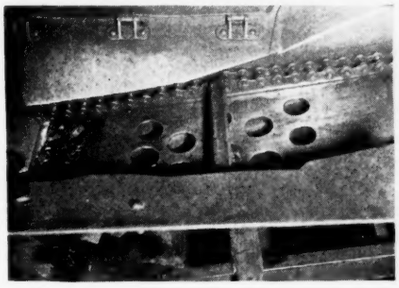
Inverness County Coal Field, Nova Scotia. Memorandum Series No. 74. Canadian Bureau of Mines. Mimeograph, 89 pp., paper.

Of the two groups of coal fields in Cape Breton—Sydney and Inverness—the latter group lies in a county of that name extending up the long straight west coast of the island. The Inverness coal field extends from Port Hood to Margaree Harbour and includes the subordinate fields known as Port Hood, Mabou, Inverness, St. Rose and Chimney Corner. Coal thicknesses vary from 18 in. to 15 ft. All the seams outcrop at the surface near the coast, pitch rapidly under the sea, so some of the workings are, or have been, submarine. Most complete studies, physical, chemical and preparational, are tabulated in this publication.

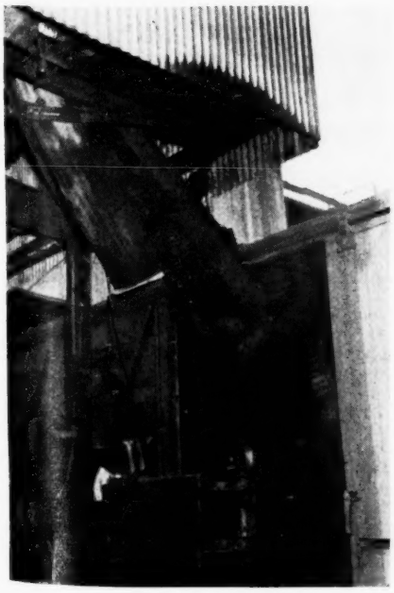
# WHAT'S NEW IN OPERATING IDEAS

## Screens Remove Degradation From Box-Car Loadings

Removal of breakage in coal loaded into box cars is just as thorough as in the case of coal loaded by other methods into open-top equipment at the Calumet No. 2 mine of the Calumet Fuel Co., Delcarbon, Colo., the home of "Calumet Chief" coal. Box cars are loaded through the medium of three Manierre loaders. In the case of the lump and grate loader, holes, as indicated in the accompanying illustration, have been cut in the bottom of the scraper-line trough. Breakage falls through these holes onto the car floor and is shoveled out from time to time as it accumulates.



In this lump loader, holes in the bottom of the scraper-line trough permit degradation to fall through onto the car floor.



The chute ahead of this belt-type stove loader is made of screen plate to remove degradation.

With the belt loader used for the stove size, the bottom of the chute feeding the loader (see illustration) is made of screen plate, the breakage falling through on the outside of the car.

•

## Conveyor-Mining Efficiency Raised By Angle Faces in Angle Rooms

When rooms are turned at an angle in conveyor mining, E. A. Smith, mining engineer, Estill, Ky., suggests that there may be a number of advantages in also working with the room faces on an angle, as indicated in the accompanying illustration. With this system, the face conveyor need not be swung in completing rooms and the advantages include:

1. With entries driven on the butts, the rooms may be turned at an angle and still have the room work on the faces; also room faces are kept parallel with the center line of the entry, regardless of way in which it is driven, which may be an advantage under certain conditions.

2. When butt-off or boundary lines parallel the entry, no extra work is required to take out the lagging room corner in order to square up with the line.

3. A better coarse-coal percentage can be maintained in completing places because working out corners is eliminated.

4. No time or production is lost in squaring up a room with the butt-off line at completion, as the room face already is parallel with the line.

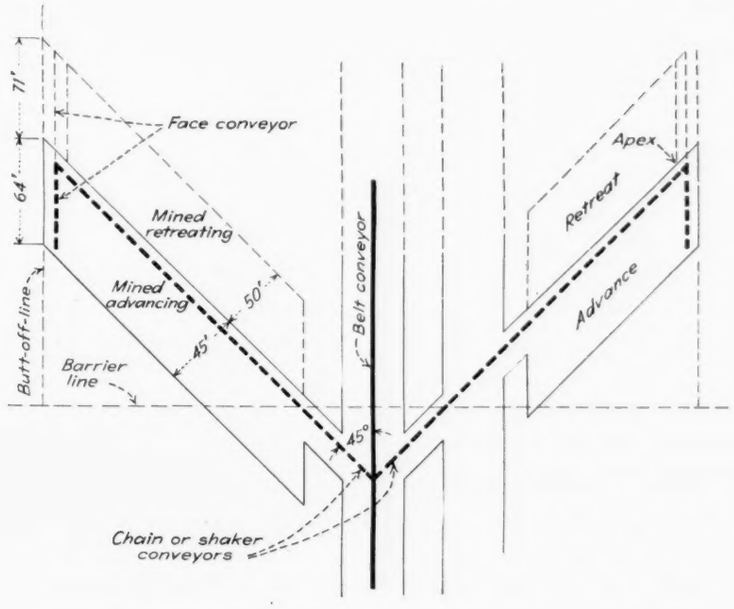
5. The longer face resulting from angle working theoretically increases the tonnage mined per conveyor move (41 per cent in the example illustrated), thus reducing the non-productive time for shifting conveyors in the same proportion.

6. The longer face tends to increase the yield of large coal because fewer corner shots are necessary for a given tonnage.

7. When retreating out of a room (see illustration), the point, or apex, at the open end of the face provides a better support for the overburden than the usual square corner, thus decreasing the possibility of falls with their attendant hazards to life and limb and loss of equipment and working faces.

8. A greater coal output per pound of powder is facilitated by the longer faces, which result in fewer tight shots per ton of production and also make it possible, in some cases, to increase hole spacing with no increase in charge per hole.

Noting that there is a possibility of some




Showing how angle faces may be used with angle rooms in conveyor mining.

increase in the time required for removal of smoke and gases as a result of putting faces on the angle, Mr. Smith states his belief that any disadvantage resulting from this condition will be greatly outweighed by the other advantages of the plan.

•

## Freeing Seized Bearings With Minimum Time Loss

Seized bearings have several causes, states P. C. Ziemke, Milwaukee, Wis., in detailing emergency freeing measures. The lubricant in a bearing serves as a "wedge" between the revolving shaft and the bearing. This wedge may be squeezed down to the vanishing point by excess loads, overly tight bearings, or stoppage of the oil rings. The result is a tight frictional grip that compares with a welded joint for stubborn refusal to loosen. Such items as the wrong grade of oil, allowing the oil to become gummy from age and oxidization, or permitting it to fall below the safe level are other causes of freezing.

"In rendering emergency treatment," says Mr. Ziemke, "first remove all the oil, since usually it is at boiling temperature and is badly contaminated with metallic substances. Its removal will cool the bearing and permit the entry of a light-bodied oil. This latter should consist of "penetrating" oil, turpentine, gasoline, kerosene, paint solvent or, in fact, any low-viscosity liquid that will penetrate between the closely joined metal surfaces. That done, the next step is to remove the connection between load and motor by throwing off the belt or disengaging a gear drive by unbolting a coupling or pulling off the pinion. In some cases, it is expedient to shift the motor aside to effect the uncoupling.

"Where a motor of modest size is involved, ofttimes the shaft may be freed by the application of hand power to pinion or pulley. In more stubborn cases hand power must be augmented by applying a lever and rope or a large pipe wrench. While the shaft may be turned in any direction convenient for the sweep of the tools used, it preferably should be turned in the direction normally maintained by the motor. Once the shaft is freed, continue to turn it over until one full revolution is made unless the shaft tightens noticeably before the revolution is completed, in which case reverse the motion and attempt completing the revolution in that direction. With a complete turn accomplished, continue to rotate the shaft while a thin stream of any one of the above light oils is poured on to cool and wash the bearing. Later drain off all the light oil and refill with a new supply, since the original filling has absorbed much heat and metal particles.

"This cycle of filling and draining must be repeated until the bearing is reasonably cool and the shaft shows indications of turning more easily. About this time a slightly heavier oil may be substituted for the extremely thin liquids and current applied to the motor, meanwhile observing the bearing for heat and rotation of the oil rings. Usually the momentary application of power serves to loosen the bearing a little more, as can be noticed by applying hand power. Now the light oil can be drained off and the regulation grade substituted, followed by applying power again for several minutes. When the bearing remains cool the load can be connected again and production resumed.

"This treatment usually requires 20 to 30 minutes when applied by two men, which fact recommends it as compared to the laborious and time-consuming job of dismantling and reassembling the motor. The economy in time and labor effected permits a leisurely and more painstaking repair and investigation during off periods to determine the cause for "freezing" and thereby prevent its recurrence."

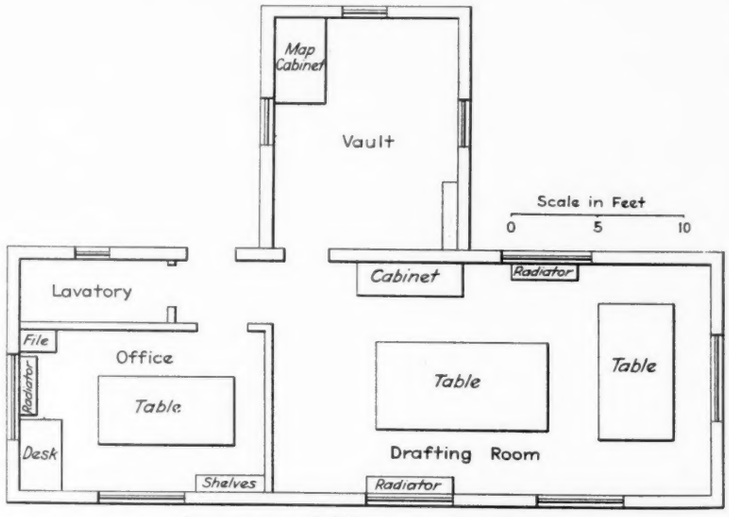
•

## Fireproof Engineering Office Serves Leckie Mines

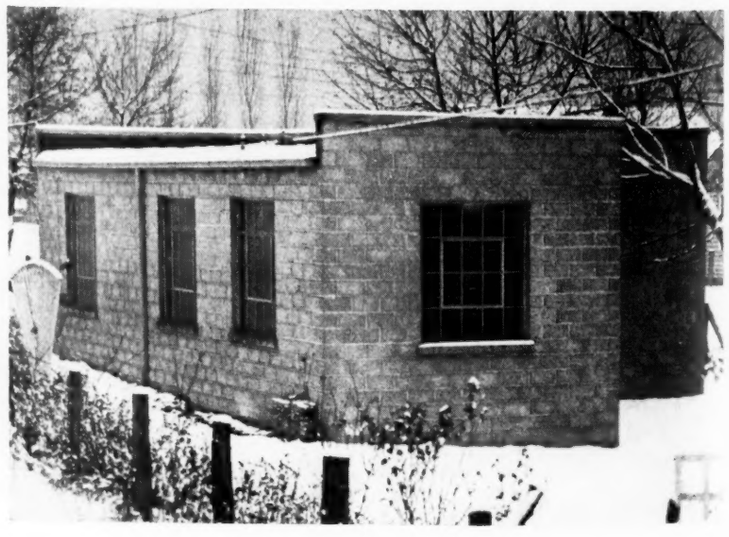
Pointing out that modern mining should be accompanied by modern engineering facilities, W. W. Coleman, chief engineer, Leckie Associated Mines, submits the accompanying floor plan and photographs of a fireproof engineering office built late in 1939 at Aflex (Ky.) headquarters. In addition to an office and drafting room, the new quarters naturally include a vault with the necessary files and cabinets. Concrete-block construction provides the necessary protection against fire.

## "No Soap!"

**The slang of it is—"it can't be done"—but around a mine it's rarely used because coal men just won't be stumped. No matter how large or small a problem confronts them, some one or group of operating, mechanical, electrical or safety men comes out with an idea to lick it. And—that's why *Coal Age* is almost torn apart by many subscribers getting to the "Operating Idea" section first! It's popular because it's practical. How many more cost-cutting, time-saving, safety-promoting ideas are in practical daily coal mining use is anybody's guess—and everybody should know about them. *Coal Age* wants more of 'em, and pays for 'em, too, at the rate of $5 or more for each acceptable idea. So send 'em in and get "some soap."**

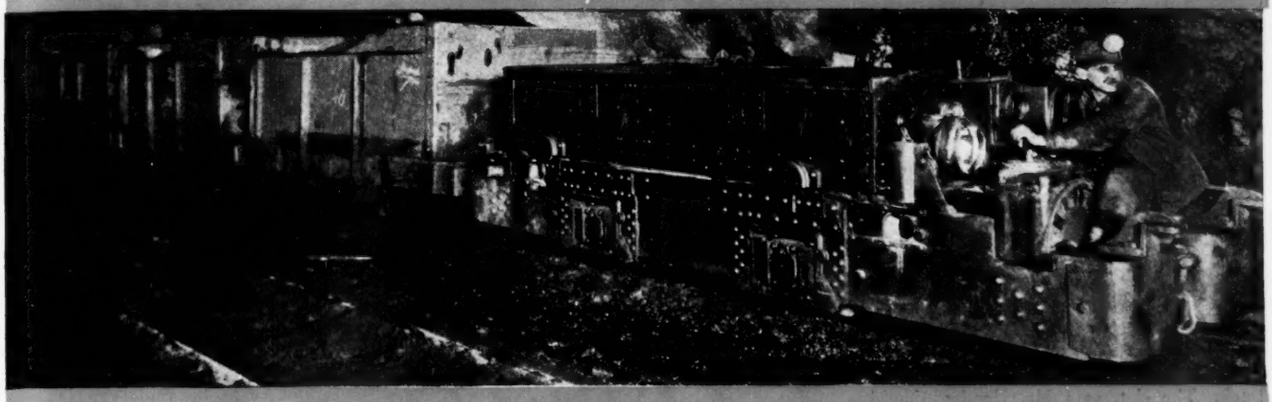



Arrangement of Aflex engineering office.



View of exterior of the office.

# NO PRICE TOO HIGH



# FOR SAFETY


APPARENT ECONOMIES effected at the cost of lessened safety immediately vanish when accident adds its own high price to the original cost. A mine explosion or fire can cost so much in life and property that SAFETY must always be considered an integral part of the price of equipment.

In comparing relative merits of various types of haulage equipment, the maximum safety offered by the type propelled by storage battery is a factor no one can afford to overlook. Mine locomotives and rubber-tired haulage equipment propelled by Exide-Ironclad Batteries bear the approval of the Bureau of Mines. Exide-Ironclads are widely used, in excessively gassy mines, under the most hazardous conditions.

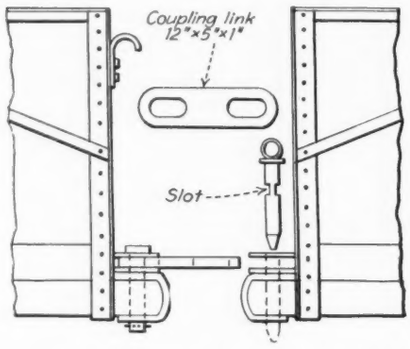
When haulage equipment is powered by Exide-Ironclads, to the advantage of utmost safety is added the advantage of economical operation. The high power ability and sustained voltage of Exide-Ironclads enable you to handle heavier loads, at faster speeds—with increased production per day. The greater safety thus obtained is enjoyed at low haulage cost. Write for booklet, "The Storage Battery Locomotive for Underground Haulage."

**Exide**
**IRONCLAD**
**BATTERIES**
With Exide **MIPOR** Separators
"MIPOR," Reg. U. S. Pat. Off

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
*The World's Largest Manufacturers of Storage Batteries for Every Purpose*
Exide Batteries of Canada, Limited, Toronto

## Slot in Coupling Pin Holds It in Place

To prevent coupling pins from working out when trips are being pulled upgrade, V. L. Hamby, New River Co., Summerlee, W. Va., suggests the use of a slotted coupling pin, as indicated in the accompanying




Slot in pin keeps it from working out of link

sketch. The slot, says Mr. Hamby, should be about ¼ in. longer than the link is thick. In other words, for example, if the link thickness is 1 in., slot length should be 1¼ in.

•

## Hot-Air Cubicle in Foundation Heats New Lamp House

In the construction of a new self-service lamp house at Puritan mine of the Puritan Mines Corporation, Mingo County, West Virginia, building dimensions were held smaller than originally planned and a provision to discourage loafing "by the fire" was incorporated by changing the original layout to take the heating stove out of the lamp room and place it in a small space or cubicle reserved in the hillside fill and foundation of the building. A cold-air duct connects one side of the lamp room with the bottom of the stove cubicle and a hot-air duct connects a top corner of the cubicle with a register in the center of the lamp-room floor.

Fig. 2—Stove for heating the lamp house is in a "hot room" served by a door in the foundation wall.

This hot-air register shows under the table in the lamp-room picture (Fig. 1). Inside dimensions of the room are 14x22 ft. and the present equipment consists of 230 Edison Type K cap lamps and 14 trip lamps, but there is rack space for 360 cap lamps. In this picture, the man at the back has just entered through the rear door and is unlocking his lamp at the magnet. The man at the right is depositing his lamp in its numbered slot in the charging rack.

The concrete and masonry cubicle for the stove in the hillside foundation of the lamp house is shown in Fig. 2. One of the flood lamps used in making the photograph was placed back out of sight in the hot-air duct to bring out the location of this duct. A wooden outside door and its casing are the only parts near this heating plant which would burn, and flame from them could not communicate to anything else combustible. During the severe cold weather of last winter this hot-air furnace, improvised from an ordinary Burnside coal stove without a metal casing and without metal ducts, proved entirely adequate for the job.

•

## Increasing Rope Life by Salvage On Draglines and Shovels

"By careful selection of the type and construction of rope used on its draglines and shovels, and by using old boom-holding and shovel-digging ropes for dragline drag, hoist and trip cables and crowd lines, the Winslow Coal Co. has been able to make a notable improvement in rope life at its strip mine at Spurgeon, Ind., according to Kenneth Youngs, manager," writes F. L. Spangler, mechanical engineer, Elmhurst, Ill.

"Some years ago," Mr. Spangler continues, "this company started using preformed rope as shovel-digging cable and found that it gave superior performance to non-preformed cable, the replacements being less frequent. With the non-preformed cable, average life was only about eight shifts. Today, with preformed cable, replacement is made regularly at the end of every fifteen shifts, although even then the rope usually does not show evidence of excessive deterioration. This rope then is used for the drag cable on one of the draglines, where it lasts for fifteen to twenty shifts before being finally discarded.

"Another improvement in rope life was obtained when cable with a wire-rope center was substituted for hemp-center rope in drag- and hoist-cable service on draglines. The wire-center cable is giving twice as long service, according to Mr. Youngs. Since the drag and hoist lines are never new cables but are cut to length from discarded boom-holding cables, it obviously was necessary to use cables with wire-rope centers for the boom lines. As an example of how this use of old boom lines for hoist and drag lines works out, the 565-ft. length of boom cable on one of the draglines is used to make three 170-ft. hoist cables for the same machine.

"The greatest wear on the drag cable occurs where it passes through the fair lead. After about ten shifts this cable is turned end for end, thereby bringing the point of wear to another section of the cable. The trip cable is replaced at least once a week, and sometimes as frequently as every three or four days. This cable is cut from the boom lines of the shovel and dragline.

"Where wedge-and-socket fastenings are employed, these can be a source of rope damage if they are allowed to become battered or are not properly used. Any sharp edges or uneven surfaces on the wedge or socket must be smoothed off. Otherwise, the rope will be damaged at this point, causing early failure. In addition to keeping all wedges and sockets in first-class condition, says Mr. Youngs, it is equally important that the wedge and socket fit the rope so that when the wedge is driven home it will not extend out of the socket but will be flush with the socket edge.

"The operator of the dragline can help to increase the life of the drag cable by

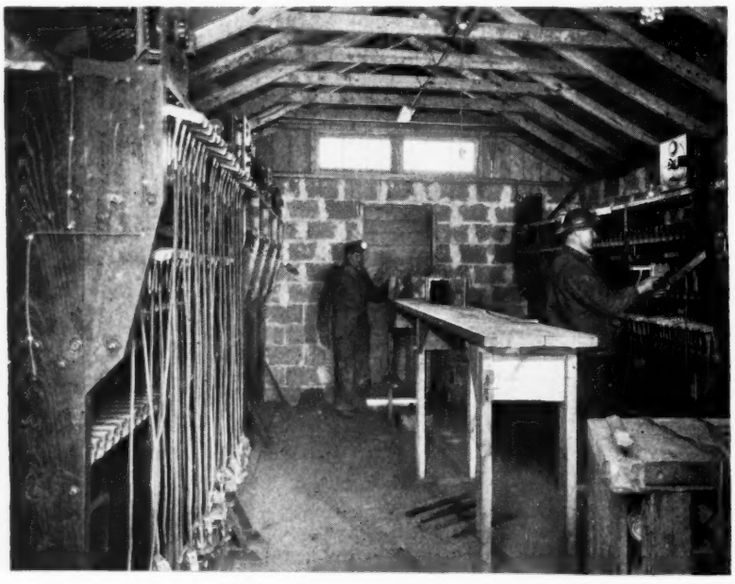


Fig. 1—Workers unlocking and racking their lamps at the end of the shift.


● Thousands of tons of clean, uniform coal are being processed each year in Morrow-Prins Multi-Flow Coal Washing Units.

The Morrow-Prins Washer, designed to handle both large and small tonnage, functions in accordance with natural physical laws, cleans and separates 75 tons hourly per foot of width and operates on from ⅓ to ½ horsepower per ton of coal cleaned per hour. Readily adapted to the individual requirements of any mine and any type of coal feed . . . requires no extensive alteration to existing tipple set-ups and a minimum structure for new installations. Morrow Engineers can install this low cost unit rapidly and efficiently without materially disturbing your present production.

May we send details?

**MORROW**

**MANUFACTURING CO. WELLSTON, OHIO**

DESIGNERS AND BUILDERS OF COAL HANDLING EQUIPMENT FOR OVER 25 YEARS

proper spotting of the machine in relation to the work. When the drag cable is pulled through stone, gravel or dirt, its life will be reduced. By using a little care, the operator usually can locate the machine so that the drag cable will clear all earth and muck."

•

### Babbitt Ring Poured in Hub Reclaims Car Wheels

Mine-car wheels with treads still in good shape but which had been placed in the scrap pile because of worn hubs are being reclaimed at less than 30 per cent of the price of new wheels at Puritan mine of the Puritan Mines Corporation, Mingo County.

Wheel with worn hub.

Steel ring in place.

Pouring the babbitt.

# 15 TONS—AIR BRAKES—AIR SANDING
# AIR-RAISED TROLLEY—10-STEP CONTROL

# Even a Whistle...


# But Only 26 INCHES HIGH

## You can make more money with this new G-E haulage locomotive for low coal

EXACTLY how *much* you can increase your profits depends primarily on the height of the vein you're working.

If you are now taking away nine inches or more of top or bottom, your saving will be enormous—because this remarkable unit is almost nine inches lower than the lowest locomotive of equal weight and power ever built before.

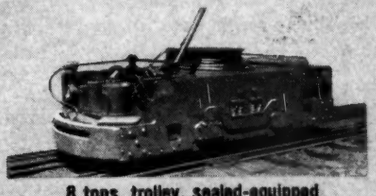
But chances are it will pay you to investigate this locomotive even if you're removing only a few inches of top and bottom. You may be able to eliminate completely this waste of time and money.

Besides being compact, this amazing locomotive has many features not provided on ordinary locomotives, including: air brakes, air sanding, 10-step electro-pneumatic control, air-raised trolley, and adequate space for the motorman and trip rider.

Undoubtedly this locomotive will have a profound effect on the design of future mine motive power. So whether you're working high or low coal, you'll want to know more about it. A bulletin now being printed reveals how this low height is accomplished without sacrificing a single important feature. Send for your copy. General Electric, Schenectady, N. Y.

## THERE'S A G-E LOCOMOTIVE FOR EVERY JOB

6 tons, permissible, storage battery



8 tons, trolley, sealed-equipped

**50 YEARS of experience have given us a vast store of basic knowledge for improving mine motive power. Because G-E locomotives are built entirely in our own factories, we are able to co-ordinate the improvements and give you modern, money-saving, completely reliable units. May we show you important advances made recently in cable-reel, battery and trolley types?**

*General Electric, Section 126-4*
*Schenectady, N. Y.*

*Send Bulletin GEA-3459, which reveals how your new 15-ton locomotive is held to 26 in. high without sacrificing one important feature.*

*Also send details about.....type locomotives.*

*Name*.....

*Company*.....

*Address*.....

.....

126-4

GENERAL ELECTRIC

Steel ring removed—job completed.

West Virginia. Although rather old, the wheels have Timken bearings. Original grease retainers of a design none too effective in holding grease and keeping out dirt and water, plus bad track conditions and a lack of proper maintenance, were responsible for many bearings going down, thus causing retainers to cut out the wheel hub. Filling the hub with babbitt, without any machining, is the essence of the repair job.

Improved labyrinth-type seals are being installed on all cars as they come into the shop for repairs. With this new seal and the babbitt-filled hub, cast-off wheels appear to be giving the same service as new wheels.

To confine the babbitt as it is poured into the hub, a steel ring or ferrule was made with its outer diameter smooth and of correct measurement to impart standard bore to the babbitt ring. Due to the way in which the hubs are worn, there is no difficulty in placing this steel ring in a concentric position. When the babbitt is cold the steel ring is removed by a long punch applied through the opposite end of the bore. At the most, the babbitting job, which is done by the car repairmen, never costs over $1.65; first-cost saving per wheel, therefore, is not less than $4.

•

## Calculating Horsepower Delivery Of Angle Belts

Practically all engineering text and hand books on power-transmission problems contain tables and formulas for calculating horsepower delivered by horizontal belt drives. However, many drives are at an angle of 45 deg. and at the vertical and no formulas are available for such installations, states Paul C. Ziemke, Milwaukee, Wis., or at least he has found none to date.

To find the capacity of a vertical or inclined belt drive the angle of which is greater than 40 deg., deduct the angle of inclination from 140. The result will be the percentage of capacity of the belt as compared with a horizontal belt of the same size. A case in point: When the angle of inclination is 45 we have then 140—45= 95, which figure indicates that 50 per cent of the capacity of a horizontal drive is possible with a belt driving at this inclination.

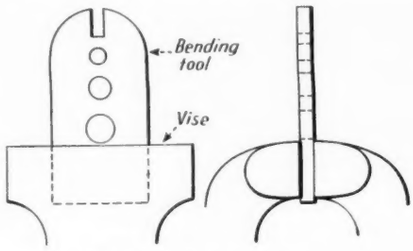
At first glance this appears to be somewhat too high a figure, but after checking angle drives over a period of years Mr. Ziemke believes it to be approximately correct.

•

## Bending Tool Easily Made From Sheet Steel

A bending tool easily made from sheet steel is described by John E. Hyler, Peoria, Ill. The tool should be from ½ to 1½ in. thick, depending upon weight of the material to be bent. In most cases it will be used for bending pipe, rods or strap iron, and for this service a ½-in. thickness is sufficient. Since there are holes drilled through the tool, it may be kept hanging near to the vise, and always be at hand.

To facilitate the bending of different sized materials, three holes of varying diameters are drilled in the tool, as shown in the sketch.




Bending tool is held in vise.

Stock is inserted in the appropriate hole to the desired point of bend and is then pushed sidewise for bending. The slot in the end is used for bending strap material and additional slots to accommodate different sized materials may be made.

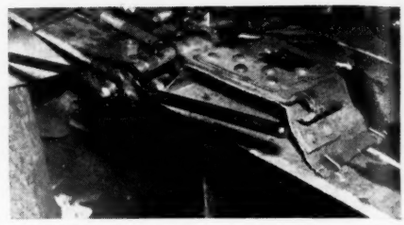
Before pipe is bent it will be well to fill it with dry sand and seal both ends tightly with wooden plugs. The sand will keep the pipe from collapsing as it is bent and can easily be removed when the operation is completed. Stock may be pushed in any direction when bending, "but it is better to push it sidewise, as less deformation of the tool will occur in long use. . . . Bear in mind that it is always easier to make a bend in a piece of material having a long extended end, as this provides helpful leverage. Therefore, in making a short piece of stock that incorporates one or more bends, it is best to form the required bends on the end of a longer piece and then cut it to the desired length."

•

## Handy Bolt Vise Made From Discarded Conveyor Pans

Shaker conveyor pans, fastened together with bolts, often become loose at the pan joints. The vibration strips the bolt threads, and when the pans are moved these worn bolts frequently are reused rather than delay the crew by waiting for bolts to be returned from the shop. Naturally, the worn bolts cannot be completely tightened and the efficiency of the shakers is lowered. A solution of the problem is to rethread the worn bolts on the job, which necessitates a vise to keep the bolts from turning while this is being done.

A practical vise made from discarded conveyor pans is in use at the Exeter colliery, Payne Coal Co., Pittston, Pa. About 1 ft. is cut off the end of an old pan and fastened to a wood bench, usually by nails. Through one of the ears a worn bolt is inserted and rethreaded with a die. The bolt cannot turn because the head is held fast between the pan and ear.



The end of a discarded conveyor pan makes this vise for rethreading bolts.

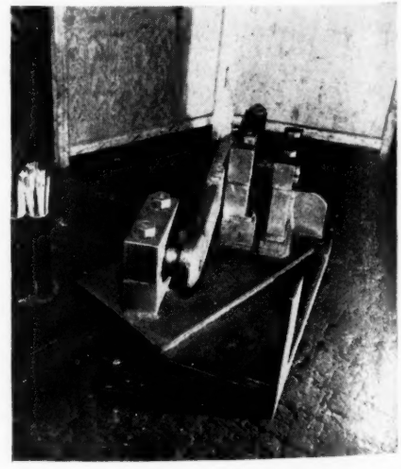
This vise now is standard equipment on each section where conveyors are in use. Less time is wasted trying to tighten or loosen jammed nuts and conveyors are kept in more efficient working condition.

•

## Welding Swivel-Pin Arms Facilitated by Jig

For arc-welding swivel-pin arms on 11BU loading machines, the jig here illustrated was made in the central shop of the Island Creek Coal Co., Holden, W. Va. It positions the parts in exact alignment ready for welding and is built with great strength to resist the tendency for a part to warp during welding. Breaks in the swivel arms usually occur where no machining of the weld is necessary. No. 7 Fleetweld coated rod is used regularly for this class of work.

The jig base is ¾x12-in. channel with a wing extension welded to one side. A post on the corner of this extension serves to hold the jig tilted or on its side for a convenient welding position. Two pieces 3x4x8 in. were used to make the large clamp at the left. The pieces constituting the center clamp are 2¼x4x9 in. and those of the clamp to the right are 2x4x8 in. The jig was made to fit a new swivel-pin arm, thus assuring correct dimensions and form.



Holds arm in exact position and resists warping during welding.

# WHAT'S NEW IN THE FIELD

## Intensive Research for Defense Launched by Coal Industry

Expanded and intensified activities in research and technology looking to new uses and new economies in the use of coal are under way as one phase of the many-sided cooperative efforts of bituminous coal producers for national defense. Approval by the board of directors of Bituminous Coal Research, Inc., a subsidiary of the National Coal Association, of an expanded research program was announced on June 23 by John D. Battle, executive secretary of the parent organization.

The initial expense quota is $40,000 annually and total commitments now in hand on the basis of a three-year term are upward of $120,000, to which the railroads and allied corporations are contributing, as well as N.C.A., Appalachian Coals, Inc., and local associations and member companies.

To gain new and regain old markets for the coal industry are objectives of the program. Embodied in the eight-point program are: the problems of smokeless hand firing of coal, completely automatic residential heating, dustproofing of coal, railroad locomotive fuels, publication of engineering bulletins, a standard smokiness index, modification of ash fusion characteristics, and emission of solids from stokers.

The development of coal consuming devices to improve the use of coal and to serve new markets will be the principal activity of the program. Manufacturers are being asked to cooperate in designing and manufacturing the new burners. According to E. R. Kaiser, assistant to President H. N. Eavenson of Bituminous Coal Research, this agency will also coordinate research on coal throughout the country and keep executives and engineers of the coal industry constantly informed on trends in coal utilization and research by publication of periodical digests and engineering bulletins. Technological studies will be made in conjunction with and through the facilities of Battelle Memorial Institute, Columbus, Ohio.

•

## New Preparation Facilities

Chicago, Wilmington & Franklin Coal Co., Chicago: Contract placed with Jeffrey Mfg. Co. for one 7-ft. Baum jig to clean 500 tons per hour of 6x7/16-in. coal.

Pittsburg & Midway Coal Mining Co., Mine No. 15, Mineral, Kan.: Contract placed with McNally-Pittsburg Mfg. Corporation for one McNally-Norton automatic washer to clean 350 tons per hour of 6x2-in. coal; will displace present cone cleaning system; to be completed early in September.

Princeton Mining Co., Princeton, Ind.: Contract placed with Jeffrey Mfg. Co. for cleaning-plant equipment including one 7-ft. Baum jig to clean 450 tons per hour of 6x1/4-in. coal.

Rochester & Pittsburgh Coal Co., Ernest Mine, Ernest, Pa.: Contract closed with Fairmont Machinery Co. for Chance sand-flotation equipped cleaning plant; capacity, 200 tons per hour.

Supreme Anthracite Coal Mining Co., Ontario Breaker, Peckville, Pa.: Contract closed with Finch Mfg. Co. for one 4-ft. Menzies cone separator to clean buckwheat and rice coal; feed capacity, 22 tons per hour.

•

## Island Creek Interests Start To Develop Big New Mine

The Marianna Smokeless Coal Co., a wholly owned subsidiary of the Pond Creek Pocahontas Co., which operates mines in McDowell County, West Virginia, has executed a lease with the W. M. Ritter Lumber Co. for about 6,000 acres of land on the Virginian Ry. near Pineville, Wyoming County, and will immediately proceed with development of the property for coal production. Announcement of the plans of the new company were made by James D. Francis, president of the Island Creek Coal Co. and the Pond Creek Pocahontas Co.

Two mines with mining plants, villages and stores will be constructed on the property and about 600 men will be employed. The mines will be equipped with modern steel tipples, washing and cleaning plants, and will make all sizes of smokeless coal for domestic, steam and industrial use. The plant will have a capacity of 750,000 tons per annum and will be fully mechanically operated. Contracts have been let to the Kanawha Mfg. Co., Charleston, W. Va., for construction of the two tipples.

The company will operate in the Sewell seam, production to begin around Oct. 1. Mr. Francis expects that the mines will be working at capacity by Jan. 1. The plant will operate as a unit of the Island Creek organization.

## Keeping Step With Coal Demand

### Bituminous Coal Stocks

| | (Thousands of Net Tons) June 1 1940 | May 1 1940* | June 1 1939 |
|---|---|---|---|
| Electric power utilities | 9,838 | 9,514 | 6,740 |
| Byproduct coke ovens | 5,956 | 5,150 | 2,598 |
| Steel and rolling mills | 533 | 565 | 545 |
| Railroads (Class 1) | 4,607 | 4,526 | 5,196 |
| Other industrials† | 11,515 | 10,766 | 7,534 |
| Total | 32,449 | 30,521 | 22,613 |

### Bituminous Coal Production

| | (Thousands of Net Tons) May 1940 | April 1940 | May 1939 |
|---|---|---|---|
| Electric power utilities | 3,746 | 3,561 | 3,032 |
| Byproduct coke ovens | 6,000 | 5,632 | 3,383 |
| Steel and rolling mills | 751 | 725 | 678 |
| Railroads (Class 1) | 6,530 | 6,721 | 5,915 |
| Other industrials† | 8,760 | 9,433 | 7,510 |
| Total | 25,787 | 26,072 | 20,518 |

* Revised. † Includes beehive ovens, coal-gas retorts and cement mills.

## Utah High Court Rules Against Benefits During Suspension

In a unanimous decision on July 13 the Supreme Court of Utah upheld the State Industrial Commission's previous ruling denying unemployment compensation benefits to members of the United Mine Workers alleged to have gone on strike last year while employed by the Utah Fuel Co. at Clear Creek, Utah. The appeals examiner for the commission had found in favor of the miners, but his verdict was overruled by the commission. The men thereupon appealed to the State Supreme Court. They had been parties to an agreement with the company which expired March 31, 1939, and which had been extended, after failure to reach a new one, until April 19, when the union notified the operators that work would cease May 4.

The Utah court's decision, written by Justice Roger I. McDonough, said in part, quoting the State law: "An individual shall be ineligible for benefits for any week in which it is found by the commission that his total or partial unemployment is due to a stoppage of work which exists because of a strike involving his grade, class or group of workers at the factory or establishment at which he is or was last employed."

The men claimed compensation because the night shift at the mine had been told by the company not to report on May 4. However, the court said: "But testimony was offered that the night shift merely loads and does not dump its coal. The company points out that it did not want coal stanading in its mine and that no workmen would be present to dump the coal on May 5. The commission reasonably could find from this that the night shift did not work on May 5 because of a strike called for midnight of that day."

•

## Anthracite Engineers Elect

At the annual banquet of the Anthracite Section, American Institute of Mining and Metallurgical Engineers, Hazleton, Pa., June 28, 1940, at which the principal speakers were H. G. Moulton and A. B. Parsons, president and secretary respectively of the institute, and H. H. Otto, retiring chairman of the section, was toastmaster, the following were elected as officers of the section: W. H. Lesser, electrical and mechanical engineer, Pierce Management, Scranton, chairman; W. C. Jones, general superintendent, Jeddo-Highland Coal Co., Hazleton, vice-chairman.

The following were elected as executive committeemen for one year: H. J. Connolly, president and general manager, Pennsylvania Coal Co., Scranton; F. S. Sanders, assistant district manager, Goodman Manufacturing Co., Wilkes-Barre; Mr. Jones; Evan Evans, operating assistant to the gen-

eral superintendent, Lehigh Navigation Coal Co., Lansford; S. H. Ash, U. S. Bureau of Mines, Wilkes-Barre; and C. D. Rubert, district superintendent, Lehigh Navigation Coal Co., Lansford, who replaces T. D. Lewis, general superintendent of that company (recently deceased).

Election of the secretary-treasurer is a function of the board. It is understood that W. B. Geise, Susquehanna Collieries Co., Nanticoke, Pa., has since been elected. Four executive committeemen hold over, being elected for two years: Paul Sterling, H. B. Stockett, H. D. Kynor, L. D. Lamont. Five hold over being elected for three years: Mr. Lesser, C. A. Garner, Mr. Otto, Mr. Geise and E. C. Weichel. A film of the Philadelphia & Reading Coal & Iron Co. entitled "Buried Sunshine" was presented at the banquet.

•

### Coal Processing Bill Signed

House bill No. 30, recently passed by the Illinois General Assembly, authorizing counties to construct coal processing plants to produce smokeless fuel from Illinois coal, was signed by Governor Horner late in June. The measure, introduced by Calvin D. Johnson, of Belleville, will permit counties to take advantage of the results of successful experiments now being conducted by the State Geological Survey, at Urbana.

•

### Giant Shovel Boosts Output

The new Marion 35-yd. Type 5561 strip shovel built for the Tecumseh Coal Co., near Dickeyville, Ind., is now in operation. Increased output is greatly facilitated by the two-part dipper stick, which insures an easier digging cycle. As can be seen in the picture on the front cover, the shovel dipper completely dwarfs an ordinary man. Another innovation is that the crawlers are so arranged that the belts swivel independently both laterally and transversely, this flexibility enabling the shovel to conform to the surface of the coal without imposing undue strains.

•

### Defines 26-Week Provision

The Wage-Hour Administration has interpreted the 26-week contract provision in the Fair Labor Standards Act to mean that employees may not work more than 1,000 hours in any consecutive 26-week period.

Employees may operate under one or two contracts annually by this interpretation, but the 1,000-hour limitation must be observed over all intermediate periods of 26 weeks, as well as for the two specific periods of the contracts: i.e., the first week of the second contract period plus the last 25 weeks of the first must not exceed 1,000 hours worked.

Where only one 26-week contract is in operation, employers will be required to meet the weekly 42-hour (40 hours beginning next autumn) limits for other periods of the year.

Contracts under this section, in the W.H.A. interpretation, can be made only with unions certified by the National Labor Relations Board specifically for this purpose, in addition to certification for collective bargaining.

## Lubrication, Longwall Roads and Shotfiring Vie With Education at Sydney Meet

DIVERSITY marked the program of the 53d annual meeting of the Mining Society of Nova Scotia at Sydney and Glace Bay, N. S., June 20-21. Lubrication, development, construction and maintenance of longwall roads, ways to divert to coal engineers now going to other forms of mining, safety in shooting and responsibility for safe operation were among the subjects discussed.

Cheaper power, said A. E. Flynn, professor of mining, Nova Scotia Technical College, in his presidential address, has revolutionized industry. A man can produce 1/6 hp. per hour, but the cost of an electrical horsepower hour approximates only 2c. Today, mining men tell the colleges their graduates must be leaders not only in science but also in the social world.

Institute's new president, H. B. Gillis

A lubricant must spread over the surface on which it is placed, explained F. L. Thompson, industrial sales department, Imperial Oil, Ltd. This wetting is due to an attraction between fluids and solids the intensity of which varies with the characteristics of the substances paired. As molecules of all fluids carry an electrical charge about which is set up a field of force, usually unsymmetrical, and as solid bodies, such as shafts or bearings, also extend fields of force, some repulsion or attraction is inevitable. Where attraction results, the solid is wetted. With the opposite electrical condition, no wetting occurs.

Each metal combination, therefore, calls for its own particular lubricant, continued Mr. Thompson. Lubricants must not only spread but cling to the surface they lubricate. Boundary, or thin-film, lubrication depends primarily on this ability of the lubricant to hang on a metallic surface and spread itself. In this lubrication, the bearing is only partially lubricated and some dry friction occurs between peaks of microscopic roughness on the metal surfaces. With fluid-film lubrication, no points in the bearing surface touch each other, though when the bearings start to move, the lubricant is merely adsorbed by the metals, and only boundary lubrication for a while can be obtained.

When the viscosity *(Z)* or the speed *(N)* is increased, the friction coefficient rises, but an increase in load (or pressure) *(P)* has an opposite effect on the coefficient, declared Mr. Thompson, for the coefficient of friction $= aZN \div P$ where $a$ is a constant. An increase in load decreases the thickness of the oil film, resulting in less shear in proportion to the load increase. Relationships between speed and coefficient are illustrated in Fig. 1. The curve shows a high starting friction which decreases, becoming a minimum at the point of full-fluid lubrication. Beyond this point, increase in speed augments friction until viscosity is so reduced by heat due to friction that the effect of increase of speed is counterbalanced, unless, of course, the thickness of the film of lubricant has decreased so greatly that the metals contact, causing a rise in temperature and possible seizure. So long as the film is maintained, the metals do not contact and there is no wear, so abrasion can occur only when starting and stopping.

However, quite often peaks in the metal surfaces make boundary and full-film lubrication alternate. Other examples of partial-film lubrication are with worm-gear and wheel-gear mechanisms and in vibrating shafts, which latter, due to misalignment or to unbalanced free pressures, impose periodic momentary loads on the lubricant, resulting in boundary lubrication. When the load is released, the film thickens, and a full film is established.

A lubricant may permit a bearing to seize because (1) under boundary-film lubrication it may lack good lubricating characteristics, (2) the lubricant in use may suffer rapid deterioration from oxidation or (3) it may change in body too rapidly with change in temperature. However, the bearing may be to blame from (1) poor alignment, (2) materials too soft for loads imposed, (3) clearance so small that an oil film is impossible, (4) lubricant entry holes too small or improperly placed or (5) poor design of grooving for lubricant distribution.

Gravity is no index of source or of quality, though it is a helpful refinery control

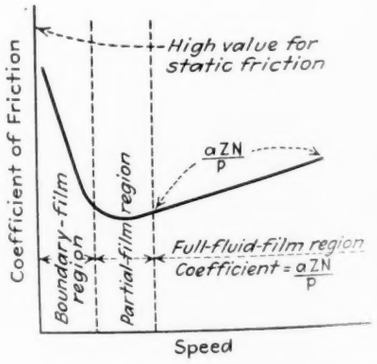



Fig. 1—Coefficients of friction first decrease rapidly and then increase slowly with increase of speed.


## The Profits are in Lower Operating Cost as well as in Reduced Hazards to Life and Property

Assuming that you have selected a wire rope of high quality and proper construction, there is one other vital consideration that will affect both the safety and economy of your work—*An Adequate Factor of Safety.*

If there is not a proper ratio between the strength of the rope and the *maximum* load to be handled, the rope may be overstressed . . . a condition no rope can long survive, and the result is premature failure—and possibly a serious accident.

For general purposes, it is never advisable for the working load of a wire rope to exceed one-fifth of its breaking strength. This means that the Factor of Safety should be not less than five.

Factors of safety in excess of five, varying up to eight and even more, are often required, depending upon the various classifications of service. For any classification a careful and thorough consideration should be made of all pertinent data, including loads, acceleration, deceleration, speed, length of rope, attachments, size and arrangement of sheaves and drums, conditions causing corrosion and abrasion, and the degree of danger to life and property. Should any doubt arise we suggest that you consult a wire rope manufacturer.

*This advertisement is published for the purpose of helping all wire rope users obtain safer and more economical service from their wire rope*

**A. LESCHEN & SONS ROPE CO.**

WIRE ROPE MAKERS — ESTABLISHED 1857

5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK . . . 90 West Street
CHICAGO . . 810 W. Washington Blvd.
DENVER . . . 1554 Wazee Street

HERCULES RED STRAND WIRE ROPE

SAN FRANCISCO . . 520 Fourth Street
PORTLAND . . 914 N. W. 14th Avenue
SEATTLE . . 3410 First Avenue South

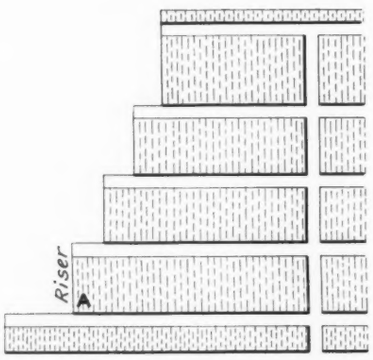



Fig. 2—Points on roadways of stepped longwall faces have two types of strain: (1) as the heading is being advanced and (2) after each point has been overtaken successively by the advance of the riser of the longwall.

figure. All lubricating oils have flash points well beyond the danger zone, but the flash point is valuable with internal-combustion engines, as it indicates whether the oil will vaporize at the high temperatures experienced by such equipment. Oils of the same viscosity do not necessarily have the same oiliness. That quality is a measure of film strength and of resistance to rupture under load. Fixed oils, having an animal and vegetable origin, are more oily than mineral oils, although inferior in other respects. The viscosity index is a number expressing the change in viscosity with temperature. For all-round performance, an oil with high viscosity is desirable. Pour point, or the ability of oil to flow at low temperatures, also is important.

Color of a fresh oil identifies it, but is no criterion of quality. It indicates, to some degree, in a used oil how much it has been oxidized or contaminated. Oil and water should not emulsify because the emulsions may clog oil lines or bind oxidized oil and foreign particles together to form sludge. Dirt and acids tend to hasten, and maintain, emulsification. For certain uses, an oil having little tendency to emulsify is absolutely essential.

Oxidation causes the formation of glycerides and fatty acids, and these become gums and resins. Only when in large quantity will fatty acids react with metals to form the metallic soaps that promote emulsions. Mineral acids, such as sulphuric, are rarely found in lubricating oils of good quality, but if present they will corrode or pit metal. Oils that must remain in circulating systems for long periods and are subjected to high temperatures should have a high resistance to oxidation. Sulphur is undesirable only when oil is burned, in which case the sulphur dioxide is objectionable. In the presence of heat and air, all oils will form carbon, declared Mr. Thompson.

A compounded oil is a blend of mineral oil with vegetal or animal oil or some other special substance. Compounding may: (1) increase strength of the film to cope with heavy loads or intermittent oil supply; (2) emulsify readily where lubrication must be provided under wet conditions; or (3) increase cohesiveness, thus lessening dripping or throwing of oil. Grease is a lubricant consisting of mineral oil and a saponified substance called soap. Of the cooked greases, lime-base greases are water-resistant but cannot stand agitation or high rotative speeds; soda-base greases, though satisfactory for high rotative speeds and much centrifugal force, so readily emulsify that they cannot be used where much water is present; aluminum-base greases are waterproof, racky and stringy and cling strongly; lead-base greases resist heavy loads.

Cold-set greases resemble lime-base greases and are widely used in rough, slow-speed bearings where lubrication efficiency is less important than economy. Residuum greases adhere strongly and are stable at high temperatures, but have greater internal friction.

A perplexing problem in longwall mining is the maintenance of roads along which traffic is conducted until downward pressures

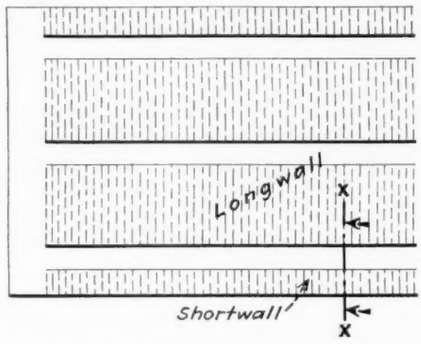



Fig. 3—With straight-face longwall, the action is less complicated than with steps. Cross-section XX may be either as in Fig. 4 or Fig. 5.

equal upward reactions, and resistant stresses balance side thrusts from broken ground, declared H. C. M. Gordon, assistant to the general manager, Dominion Steel & Coal Corporation. Roads can be assured of almost complete equilibrium by driving them through consolidated wastes which extend at least 500 ft. on either side of the tunnel. The problem, however, is not one of building new roads in old workings but of maintaining the roof above the regular longwall roadway in the unsettled ground existing for about that same distance from the face. Bottom as well as roof gives trouble, so inverted arches and even steel circles may have to be used to guard against excessive distortion.

In earlier days the longwall face was stepped as shown in Fig. 2, and coal was loaded into cars at the longwall bottom at *A*. This involved two developments and two roof actions: (1) that arising from driving the road forward beyond the lower longwall step and (2) the advance of the step itself. Thus, mining causes two troublesome reactions. On the other hand, a straight longwall face and a long waste develops only one less difficult reaction. Unfortunately, at Stellarton, a long waste is not practicable, because fires from spontaneous combustion are not easily controlled.

With single packwalls, brushing of roof starts at *A*, the bottom of the last step in the longwall. Both sides of the advancing roadway are closely packed, preferably with strong material because small coal and weak shales permit more subsidence and delay equilibrium. Sometimes the clay bottom on the upper side of the roadway has to be excavated, so that packs can rest on solid bottom and will not squeeze downhill into the road.

It is preferable to take down the final brushing at a point 250 ft. from the longwall, because most of the settlement by that time will have occurred, but material from this brushing has to be taken out of the working, as there is no convenient storage space in the immediate vicinity. That is why sometimes the full thickness of the top is brushed down at one operation. The roadway is supported with timber until the roof has been brushed to its full height. If cambered steel arches are used, an 18-in. camber in a 12-ft. roadway will suffice.

Thrust toward the dip from the pressure

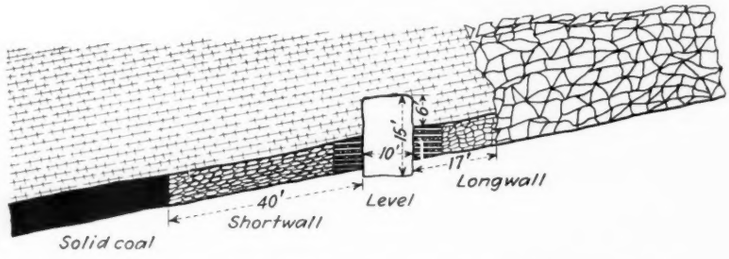



Fig. 4—Single packs as shown here give inferior results to double packs.

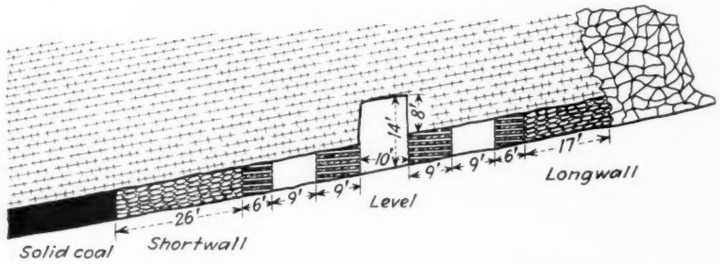



Fig. 5—With double packs the stresses form an arch over interior packs and roadway, and this arch carries most of the burden. The outside packs should be tight and the inner packs more yielding

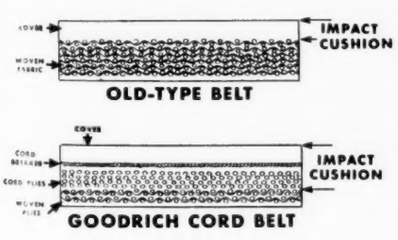
# Goodrich CORD Conveyor Belt

## *has 4 times greater impact resistance, often increases belt life 2 or more times*

### *Ply separation unknown, flexing failure eliminated, troughs perfectly, almost stretchless*

DUE to an entirely new principle of construction, developed by Goodrich engineers, many mines can now double conveyor belt life at no greater initial cost. Where failure has been caused by impact, this Goodrich construction may increase your belt life as much as 10 times. A look at these features will show you why:

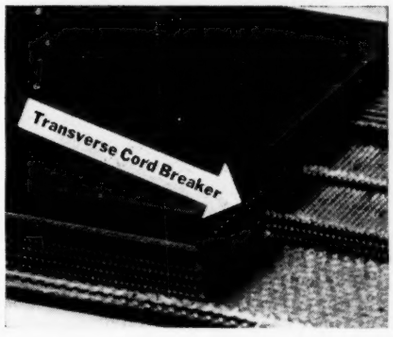
### *Cord Construction*




Instead of woven plies throughout, all plies except those nearest the pulley are of parallel anti-stretch cords surrounded by rubber which forms a connected mass. These plies have practically the same impact resistance as the cover. Since resistance to impact increases as the square of the increase in cover thickness a Goodrich Cord Conveyor Belt of average thickness gives 4 or more times the impact resistance of the former woven ply construction.

This explains why a Goodrich Cord Belt has already carried 2,700,000 tons on a severe installation where the best previous belt failed at 400,000 tons.

### *Transverse Cord Breaker*




This is a ply, between cover and cord plies, of *transverse* cords, each insulated by rubber. This ply distributes impact shock. The cord breaker also increases adhesion of cover to carcass at least 50% and prevents what is probably the greatest cause of belt failure—distortion of rubber cover beyond its elastic limit.

### *Other Important Advantages*

Ply separation is unknown because the rubber through which the parallel cords run is one connected mass—there are no plies which can separate.

Because each cord is entirely surrounded by rubber, flexibility of the Goodrich Cord Belt is increased many times and failure from flexing is virtually eliminated.

Perfect troughing is assured, full or empty, because of the great transverse flexibility due to the cord plies running in the direction of travel.

Metal fasteners can be used in many installations, but the Goodrich method of field splicing is so simple and increases belt life so much that most users naturally employ it.

### *Long, Successful Experience*

Goodrich Cord Conveyor Belts have been on many test installations, in mines, tipples and loading docks, since 1932. In every one they have shown important increases in service, substantial reductions in conveying cost-per-ton. Write for full information today. This improved belt may easily be the means of drastic cuts in belting costs for you, too. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

**Goodrich**
**CORD CONVEYOR BELTS**

(Another story of Goodrich development appears on page 1)

of the rock which has broken over the goaf is one of the troublesome features; if the roadway roof has been cut high, the top of the cut breaks loose and falls badly. To avoid this, the top often may best be shot in two shallow "carries" instead of one high one. Building only two packwalls, one on each side of the roadway, does not afford the best results. It is better to build a 9-ft. pack on each side, leave a 9-ft. opening on either side of these packs and then build beyond these openings another strong pack 17 ft. wide.

Packs adjacent to the roadway—"internal packs"—need not necessarily be 9 ft. wide. They should be built less tightly than the "external packs," which latter act as supports on which the stresses will arch and carry the main part of the weight, letting the smaller central packs give way a little and escape the mammoth stresses imposed by the main body of the roof. Thus, they take only the weight of the intradosal material.

### Double Packwall Carries Load

The double packwall with its main reliance on the exterior walls, declared J. C. Nicholson, general superintendent of coal mines, Dominion Steel & Coal Corporation, lessens the weight on the roof and side packs of the roadway. Though brushing in two "carries" may be desirable, one cannot always brush the roof twice, as belts may interfere, and there may be no space to insert a pan above the belt for its protection. Moreover, if a pan can be inserted, brushing is not needed.

At Waterford, said Louis Frost, mining engineer, Dominion Coal Co., roof trouble persists despite "double packing," though not as much as before. Steel arches should not be used until the roof has nearly settled. Brushing to the full height in one operation is not desirable. With greater roadway width, the more thrust, the more the compression of the pack and the greater the heaving, asserted David Morrison, mine manager, Dominion Coal Co. A small "carry" may be better than a large one, but, where there is need for packing material, that consideration is likely to overpower all the others. When, however, 20 ft. of solid roadway packing was done, conditions were worse than when the packing was less wide. To have the best roof conditions, declared Joseph Kalbhenn, assistant engineer, Dominion Coal Co., all the area mined should be backfilled tight.

One cannot use the system described successfully without changes in detail from one mine to another or in different sections of any one mine, admitted Mr. Gordon. Bumps ceased at Springhill when the longwall faces were advanced in one straight line 1,200 ft. long. If it is cheaper to step a face, it should be stepped. Taking down of rock at the foot of the riser of a stepped longwall face is not "back brushing." Only where the roof is brushed back from the face where the heavy movement is concluded and only about 10 per cent of the subsidence still remains to be experienced is entitled to that designation.

Perhaps the "downpack" (that on the lower side of the roadway) should extend further down the slope than is customary. The depth, it may be, has been governed hitherto more by economic necessity than by a desire to obtain the greatest integrity of the roadway roof. Mechanization now makes it possible to provide a distance not of 40 or 50 ft. but of 90 or more. Never cut down a road to get height. Rather shoot the roof down and lift the bottom, for, if the floor is cut, it probably will heave and have to be cut again. Sometimes, with steel arches, concrete should be erected to the springing line.

## Coming Meetings

- Sixth Annual Southern Appalachian Industrial Exhibit: Aug. 22-24, Norfolk & Western Freight Terminal, Bluefield, W. Va.
- Twenty-ninth National Safety Congress: Oct. 7-11, Stevens Hotel, Chicago.
- West Virginia Coal Conference, sponsored by West Virginia University, and simultaneous meetings of West Virginia Society of Professional Engineers and West Virginia Coal Mining Institute: Oct. 18 and 19, at Hotel Morgan and West Virginia University, Morgantown, W. Va.

Coal operations in the United States are awakening to the relative scarcity of young men prepared scholastically for coal-mining work, according to N. G. Alford, of Eavenson, Alford & Auchmuty, mining engineers, Pittsburgh, Pa., in a paper presented by title in the absence of the author. The industry is becoming conscious of its need for trained young men who are fact-minded and of its need for actual facts about its business. Producers are beginning to promote student interest in coal-mining careers.

### Mine Experience or College?

If a man is to work for the specified time on the job required under the law from one who is to get the desired position, said F. W. Gray, assistant to the president, Dominion Steel & Coal Corporation, Sydney, he will be well matured before he goes to college and will have arrived at an age when his stay there will be financially difficult. If he puts college before mine experience, his financial condition hardly will be bettered. Dr. Gray agreed that companies would do well to provide scholarships. With present legal restrictions in Nova Scotia, companies may have to go outside the Province for their engineers.

It would help greatly if operators would offer scholarships of $400 to $500 a year to promising young men, said F. H. Sexton, Nova Scotia Technical College, Halifax. Many practical men in executive jobs regret all their lives that they did not have an opportunity to go to college. Only 3 per cent of our students, admitted Dr. Flynn, expect to enter the coal mines. The other 97 per cent make the college drift toward hard-rock mining.

All the colleges know about coal is that it is black and can be burned, asserted Mr. Nicholson. Collegiate institutions in Nova Scotia were founded to teach coal mining, but they have drifted to hard-rock mining, though their students must leave the Province to get a job. Yet coal-mine wages are good, and parents would sacrifice to send their boys to a college properly conducted for training in coal mining.

No summer employment, responded G. V. Douglas, Dalhousie University, Halifax, is offered to students by the Dominion Steel & Coal Corporation, and, moreover, what is wanted is not a narrowly educated technician, taught merely the technique of coal production, but a whole man with powers of observation developed, devotion to accuracy assured, reasoning powers sharpened, memory cultivated, imagination stimulated, and desire for action quickened. The Dominion Steel & Coal Corporation used to put 40 to 50 men from the colleges to work in the mines during the summer, said Mr. Nicholson, but the students so accommodated could not overcome the hard-rock bias received in their *alma mater*, and all of them left for the metal mines.

As flame shots occur, shotfirers should never relax their efforts to improve their safety practice, urged K. M. Ed, district technical representative, explosives division, Canadian Industries, Ltd. Holes placed without sufficient coal to be dislodged must not be charged. However, those drilled into the solid are likely when fired to act like a cannon and blow out the stemming, projecting flame and hot particles into the mine atmosphere.

Shotholes usually should end at least 6 in. short of a vertical from the rear of the undercut. When too heavily overburdened, shots will act as if drilled into the solid. When a shot is given too much work to do, more than the "charge limit" may be necessary to bring down the coal. The first shot may displace more coal than was anticipated, leaving the second too lightly burdened.

Every shotfirer should use a tool that will enable him to clean the shothole properly and to examine it thoroughly before charging it. This tool should be so constructed that the shotfirer will be enabled to detect cracks which may run along, as well as across, the shothole. A second shot should not be charged until the first has been discharged.

Shotholes before charging must be thoroughly cleaned, because the shot may ignite loose cuttings and because the latter may be crowded up between the cartridges in such quantity that the detonating wave will have difficulty in jumping the gap between them, causing part of the charge either to burn or to remain unaffected, with hazardous results. A wad of damp stemming pushed to the back of the hole after the latter is cleaned should effectively drive ahead of it any dust that the tool has failed to remove.

### Must Feel for Hidden Cracks

Not only should the miner be careful to avoid known cracks or breaks in placing holes but the shotfirer also should diligently examine every shothole before charging it so as to assure himself that it does not intersect "hidden" cracks or breaks. No shothole that encounters a crack or opening should be charged. The shotfirer should have a stemmer of slightly larger diameter than the cartridges, and this should be inserted in the hole by the shotfirer after the hole is cleaned, so that he can assure himself that the latter is large enough to allow the explosive to pass easily to its far end.

Direct initiation, in which the primer is in the cartridge last loaded into the shothole and the detonator is placed in the outer end of the cartridge pointing toward the back of the hole, declared Mr. Ed, is not only the

HAZARD INSULATED WIRE WORKS, Wilkes Barre, Pa.

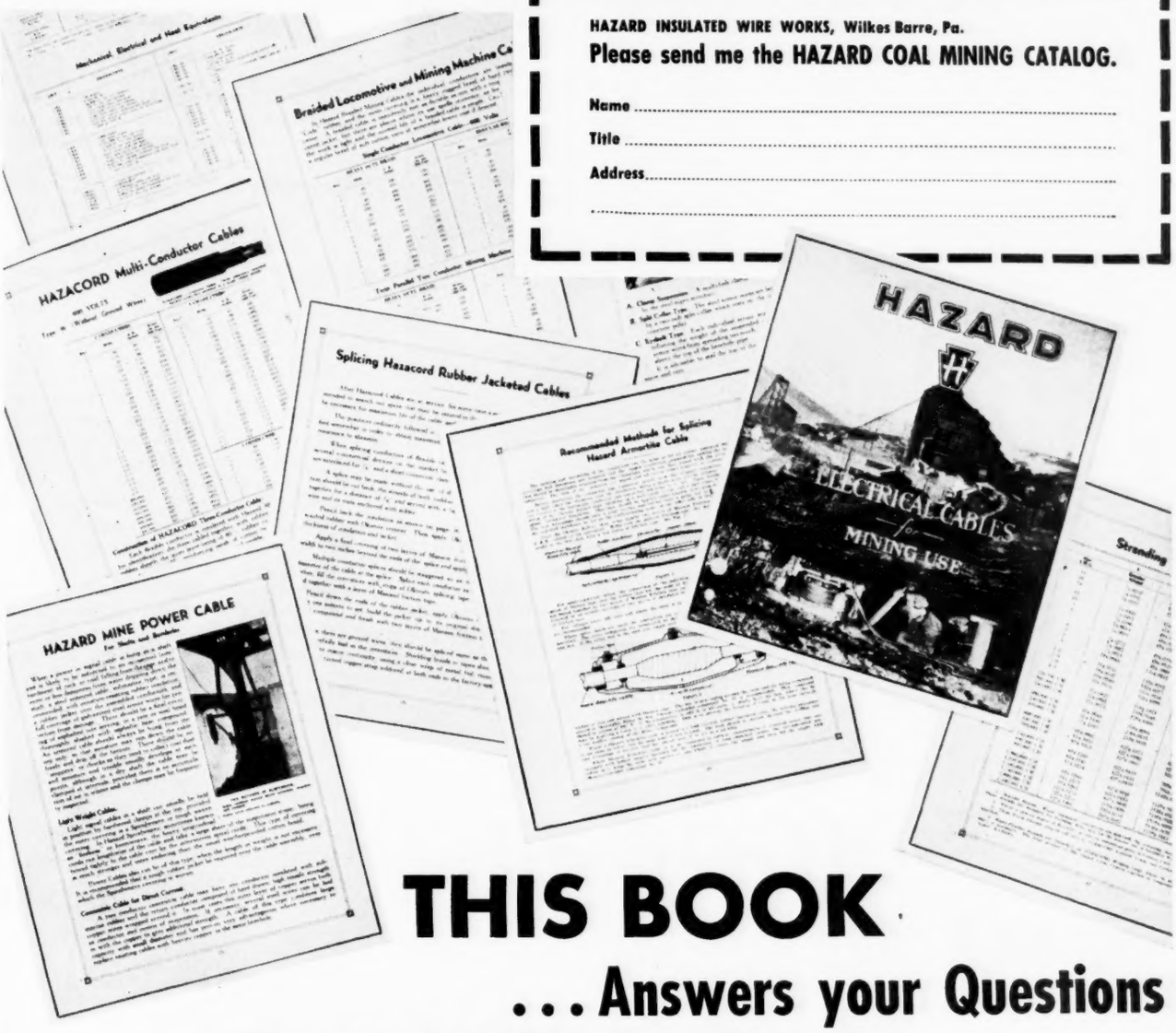
**Please send me the HAZARD COAL MINING CATALOG.**

Name .....

Title .....

Address .....

.....




# THIS BOOK

## ...Answers your Questions on Electrical Cable for Mine Use

**For complete data on constructions ...voltages...sizes...strandings and weights of any type of rubber-insulated cable used in mining consult the Hazard Catalog.**

**When in doubt as to the best procedure for splicing study pages 35-39.**

**Other subjects include size, weight and carrying capacity of copper wire; electrical formulae for determining amperes...horse power...kilowatts...mechanical, electrical and heat equivalents, rubber insulation thicknesses and a variety of other topics on which needed data is hard to find.**

**Write for a copy of the complete catalog today. You will find it invaluable.**

## HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE CO.

WORKS: WILKES-BARRE, PENNSYLVANIA

New York Chicago Philadelphia Atlanta Pittsburgh Buffalo Boston Detroit Seattle

Dallas Washington Cleveland San Francisco St. Louis Los Angeles

safest method of detonation but cuts explosive per ton, reduces risk of misfires and partial detonation and lessens hazard of ignition. Tests have indicated that direct initiation is at least three times as safe in this respect as indirect.

When a shot has misfired, a relieving hole should be drilled 12 in. or more from the first shothole. In order that the second hole may not be so directed as to intersect the first, many shotfirers indicate on the roof with a chalk mark the direction of each hole they charge. Detonator leads extending from the misfired hole should be tied to a prop or cross timber to assist in the recovery of the misfired detonator and charge. Coal thrown down by the relieving shot should be carefully searched by hand for the explosives it contains, and no metal tool should be used in this inspection.

In rock, if several shots are fired at one time (multiple shooting), greater safety may be afforded than by shots fired one after the other (sequent shooting), added Mr. Ed. Because of the stratification of the rock, the first shot may force two bedding planes apart, through which opening the second shot may project flame. Explosives sheathed with flame-extinguishing powder should not have such sheaths punctured or unwrapped, as flame may escape through such an opening.

According to tests of Canadian Industries, Ltd., sand stemming is preferable to any other tamping. In Great Britain, best results have been obtained when clay is added, with a little calcium chloride to keep the mixture fairly moist.

Present-day explosives, conceded Mr. Ed, deteriorate more rapidly than older types. Ammonium nitrate is now a large component of most explosives and is used because it is less sensitive and therefore safer to handle than nitroglycerin. It will, however, absorb water more readily than the latter, and it is moisture that is the cause of deterioration.

Since the compensation law was put in operation, the Dominion Steel & Coal Corporation has expended $6,500,000 in compensation—enough to build five mines capable of producing 8,000 tons daily—asserted A. D. Matheson, safety engineer of that company. The group of collieries thus financed would support a community of 12,000 to 14,000 persons. In all, 2,350 men had been compensated. Their wages, if they had not been injured, would have been almost a half more than their compensation, and some had not only pain and loss of salary but death as their portion.

•

## John Ira Thomas Passes

John Ira Thomas, 58, State Secretary of Mines of Pennsylvania, died July 20 of a heart ailment at a private sanitarium at Philipsburg, Pa. Mr. Thomas' business experience began 41 years ago in the engineering corps of the Cambria Iron Co. This was followed by twenty years as mining engineer and mine executive in the coal fields of Virginia, Ohio, West Virginia, the southwestern United States, northwestern Canada and Alaska.

In 1918 he was appointed a mine inspector by Governor Brumbaugh of Pennsylvania, being reappointed by Governors Sproul and Pinchot. When Governor Fisher reorganized

John Ira Thomas

the Department of Mines in 1927, he appointed Mr. Thomas Deputy Secretary in charge of the State's bituminous coal fields, which position he resigned in 1932 because of ill health. He was called back into public service to head the Department of Mines when Governor James took office in January, 1939. He also was chairman of the Anthracite Emergency Committee of Nine created to stabilize the hard-coal industry.

•

## To Extend Natural Gas Lines

Applications of three Pennsylvania operating companies in the Columbia Gas & Electric system to link up a tri-State pipe line to transport natural gas from West Virginia into New York State were approved on July 15 by the Pennsylvania Public Utility Commission. This action will permit the Manufacturers Light & Heat Co. and the Manufacturers Gas Co., both of Pittsburgh, and the Pennsylvania Fuel Supply Co., of Emlenton, to construct 117 additional miles of pipe line to join their present distribution systems.

## Continuance of Coal Act Pledged by Democrats

A promise on the part of the Democratic Party to continue the Bituminous Coal Act and to give sympathetic consideration to similar legislation to cover anthracite is included in the party platform adopted at Chicago by the convention on July 17. The paragraph in the platform is as follows:

"The production of coal is one of our most important basic industries. Stability of production, employment, distribution and price are indispensable to the public welfare. We pledge continuation of the Federal Bituminous Coal Stabilization Act, and sympathetic consideration of the application of similar legislation to the anthracite coal industry, in order to provide additional protection for the owners, miners and consumers of hard coal."

## Important Safety Problems To Be Considered

Considerations will be given to a variety of safety problems in the Mining Section program at the 29th National Safety Congress, to be held Oct. 7-9 at the Stevens Hotel, Chicago. With an opening address by the general chairman, Angus D. Campbell, safety engineer, McIntyre Porcupine Mines, Ltd., Schumacher, Ont., the following papers will be presented:

"A Course of Training for Foremen in Safety Work," F. E. Bedale, assistant to general manager in charge of safety, Consolidation Coal Co.; "Ventilation and Dust Control at Ontario Mines" (motion picture), C. Gibson, ventilation engineer, Ontario Mining Association, Timmins, Ont.; "Accident Prevention Work of the Phelps Dodge Corporation," H. C. Henrie, general superintendent, Copper Queen Branch, Mines Division, Phelps Dodge Corporation; "What Should a Mine Safety Inspector Look For"—Anthracite Mining, C. A. Peterson, safety inspector, Hudson Coal Co.; Bituminous Coal Mining, John L. Lindley, general safety inspector, Koppers Coal Co.; "Safety Accomplishments During the Past 25 Years by an Old Timer," A. A. Bowden, range safety inspector, Pickands, Mather & Co.; "Advantages That Have Been Gained Due to the Invention and Use of Methane Detectors," J. H. Zorn, safety engineer, Union Collieries Co.; Pulmonary Diseases in Mining," Dr. R. R. Sayers, Director, U. S. Bureau of Mines.

•

## Engineering Index Reaches Fifty-Fifth Milestone

The 55th annual volume of the Engineering Index, covering about 1,400 pages, with 27,000 annotations and 40,000 cross-references—a veritable encyclopedia of current data in all branches of engineering—has been issued with the Index reaching its 55th milestone, which was observed at the annual meeting of the board of trustees on May 28 at the Engineering Societies Building, New York City. The Index was founded by Dr. J. B. Johnson, former professor of civil engineering at Washington University, St. Louis. Its present president is Collins P. Bliss, dean emeritus of the College of Engineering of New York University.

Dean Bliss pointed out that "research and experimentation to develop new principles, to discover new uses for materials, or to solve problems in production, together with the reports and findings of practicing engineers, are responsible for a continuing flood of new information, the bulk of which is printed in scientific journals, trade publications, and the bulletins of governments and learned societies. Engineering Index is today the only agency for 'controlling' this flow of technical literature in the engineering field. Originally it was limited to the field of civil and mechanical engineering. But, as the ramifications of the art and science of engineering became more and more profound, the work was expanded to cover the whole range of engineering activity, at present including 280 highly specialized divisions."

Directors of the Index are Dean Bliss; Frank Y. Stewart, vice-president; H. V.

Coes, manager, Ford, Bacon & Davis, and R. M. Gates, vice-president, Superheater Co. Trustee members are: W. L. Abbott, consulting engineer; Joseph W. Barker, dean, School of Engineering, Columbia University; Karl T. Compton, president, Massachusetts Institute of Technology; J. D. Cunningham, president, Republic Flow Meters Co.; J. V. N. Dorr, president, Dorr Co., Inc.; H. F. Guggenheim, chairman, advisory committee on aeronautics, New York University College of Engineering; C. W. Henderson, supervising engineer, U. S. Bureau of Mines, Denver, Colo.; Alfred Iddles, Babcock & Wilcox Co.; K. M. Irwin, Philadelphia Electric Co.; Parke R. Kolbe, president, Drexel Institute of Technology; David Levinger, Western Electric Co.; James H. McGraw, honorary chairman, McGraw-Hill Publishing Co.; Robert A. Millikan, chairman, executive council, California Institute of Technology; A. A. Potter, dean of engineering, Purdue University; Ole Singstad, chief engineer, New York City Tunnel Authority; C. G. Stoll, president, Western Electric Co.; Arthur S. Tuttle, consulting engineer; C. L. Warwick, secretary-treasurer, American Society for Testing Materials; Harry R. Westcott, president, Westcott & Mapes; E. R. Weidlein, director, Mellon Institute of Industrial Research; W. E. Wickenden, president, Case School of Applied Science; and D. Robert Yarnall, chief engineer, Yarnall-Waring Co.

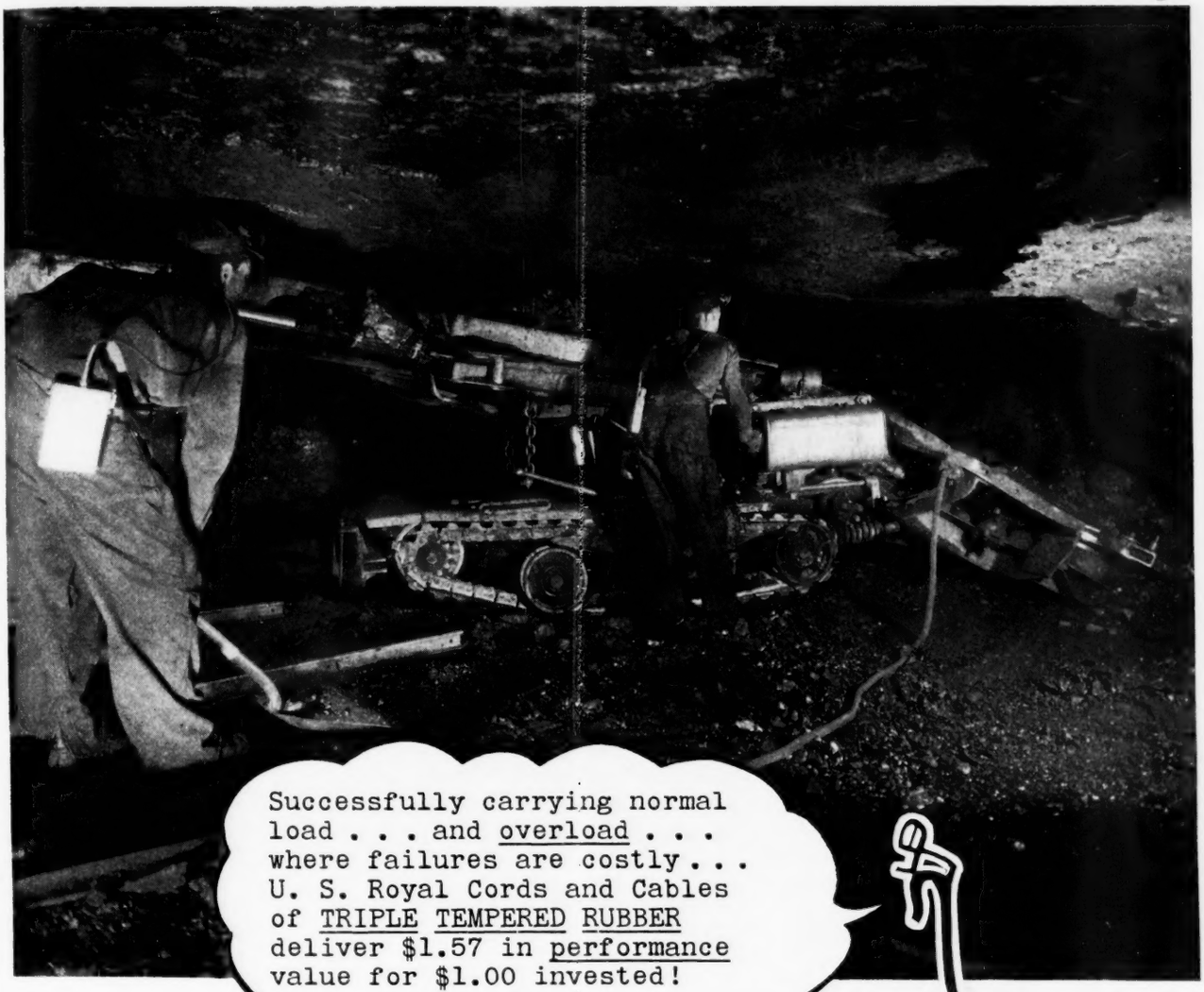
•

## Personal Notes

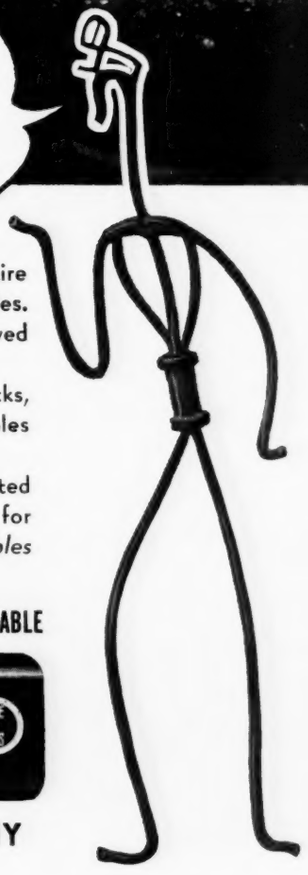
D. W. Britt, Danville, has been appointed by Governor Horner as one of the three members of the Illinois State Mining Investigation Commission representing the public. This completes the commission, the other members having been named several weeks previous (*Coal Age*, July, p. 72).

R. V. Clay, vice-president and general manager, Hanna Coal Co. of Ohio, St. Clairsville, Ohio, has been transferred to the company's Cleveland office, where he is to be associated with President R. L. Ireland Jr. in the marketing and executive end of the business.

R. V. Clay



Successfully carrying normal load . . . and overload . . . where failures are costly . . . U. S. Royal Cords and Cables of TRIPLE TEMPERED RUBBER deliver $1.57 in performance value for $1.00 invested!



IN U. S. Tires, *TRIPLE TEMPERED RUBBER*★, that toughest of all tire tread compounds, has proved its superiority over millions of *road* miles. In U. S. Royal Cords and Cables, *TRIPLE TEMPERED RUBBER* has proved superior over millions of *"drag"* miles.

On and off reels...trailing behind locomotives...run over by trucks, tractors and cars...hit by pick and shovel...U. S. Royal Portable Cables stand up longer.

That is why you'll find these *TRIPLE TEMPERED RUBBER* jacketed cords and cables return you as much as $1.57 in performance value for each $1.00 invested. *Next time specify U. S. Royal Cords and Cables with TRIPLE TEMPERED RUBBER.*

★ A special process which permits the greater use of the toughening ingredient in rubber—making a dense, perfectly uniform compound.

**U. S. ROYAL DUPLEX MINING MACHINE CABLE**


UNITED STATES RUBBER COMPANY
ROCKEFELLER CENTER, New York

JOHN C. COSGROVE, consulting engineer, Johnstown, Pa., has been reelected a trustee by Pennsylvania State College and has been appointed to the executive committee.

J. D. FRANCIS, president of the Island Creek Coal Co., has been elected a director of the United States Chamber of Commerce as well as chairman of the Natural Resources Production Committee.

T. G. GEROW, chief engineer of the Truax-Traer Coal Co., was elected a vice-president of the company at its annual meeting. He has been with the company for fourteen years.

WELLY K. HOPKINS has been appointed senior counsel of the United Mine Workers, succeeding Judge Henry Warrum, who died about a year ago. Mr. Hopkins served several years in the Texas Legislature and was appointed special assistant to the Attorney General of the United States in 1936, serving as chief of the trial section of the criminal division of the Department of Justice. He handled the Illinois bombing trial as well as Harlan County (Kentucky) cases involving coal interests.

F. HARPER HULL has been appointed acting superintendent at the Toms Creek mine of the Virginia Iron, Coal & Coke Co., Wise County, Virginia, vice J. M. Patteson.

JAMES HYSLOP, general manager, Walter Bledsoe & Co., Terre Haute, Ind., has been engaged as general manager in charge of operations by the Hanna Coal Co. of Ohio, St. Clairsville, Ohio, vice R. V. Clay, promoted.

HERBERT J. JACOBI, vice-president and general counsel of the Carter Coal Co., with offices in New York and operations in Virginia and West Virginia, has become a member of the legal firm of Rand, French & Carpenter, New York City.

W. E. E. KOEPLER, secretary of the Pocahontas Operators' Association, was elected vice-president of the Smoke Prevention Association at its convention in St. Louis.

James Hyslop

T. G. Gerow

GEORGE W. MCCAA, 26, a mining engineering graduate of Lafayette College, has been named industrial engineer by the Tennessee Coal, Iron & Railroad Co., Coal Mines division, Pratt City, Ala. Since joining the company early in 1938 he has been superintendent's engineer assistant at the Docena and Hamilton mines. He succeeds Woods C. Talman, promoted.

HUGO C. NYQUIST, hitherto superintendent at the Docena mine of the Tennessee Coal, Iron & Railroad Co., Adamsville, Ala., has been made chief engineer of the Coal Mines division, vice Arthur Waldman, promoted. Mr. Nyquist is an engineering graduate of Pennsylvania State College and has been with the company since early in 1937.

JOHN OWENS, president of District 6 (Ohio), United Mine Workers, has been named to the staff of Sidney Hillman, labor member of the National Defense Advisory Commission.

J. M. PATTESON, lately superintendent of the Toms Creek operation of the Virginia Iron, Coal & Coke Co., Toms Creek, Va., has been transferred to Leona Mines, Va., as superintendent of the Imperial and Monarch mines, vice J. C. TREVORROW, resigned.

C. W. PETERSON has been promoted from secretary to vice-president and treasurer of the Bell & Zoller Coal & Mining Co. He succeeds O. M. Gordon, resigned.

GILBERT A. REESE was elected president of the Clinchfield Coal Corporation, in succession to the late Charles E. Bockus, on July 23. He will continue as head of the Clinchfield Fuel Co., selling branch of the parent organization.

WOODS C. TALMAN has been appointed superintendent at the Docena mine of the Tennessee Coal, Iron & Railroad Co., Adamsville, Ala., vice Hugo C. Nyquist, promoted. Mr. Talman, 30, a civil engineering graduate of Virginia Military Institute, has been with the company since June, 1937.

FRANK M. WILSHIRE has been appointed first vice-president of George M. Dexter, Inc., New York City, bituminous and anthracite distributing organization. Mr. Wilshire's forty-odd years in the coal industry, part of

the time as vice-president in charge of sales of the Consolidated Coal Co. and later in a similar capacity with Island Creek, has made him a well-known figure.

•

### C. E. Bockus Is Dead

Charles E. Bockus, 71, president and chairman of the board of the Clinchfield Coal Corporation, died June 28 at his home in New York City. Born in Dorchester, Mass., he became a reporter on the Boston *Herald* at the age of 21, continuing as special and editorial writer until 1907. He became vice-president of the Clinchfield Coal Corporation in 1913. He was a director and

C. E. Bockus

former president and treasurer of the National Coal Association. During the World War he was associated with the U. S. Fuel Administration, in 1922 was chairman of the advisory coal board of the U. S. Department of Commerce, and in 1935 he was appointed deputy district secretary in the New York area for the administration of the Bituminous Coal Conservation Act.

•

### U.M.W. Wins at Diamond Mines

Employees of the two mines of the Blue Diamond Coal Co., in Webster County, Kentucky, elected the United Mine Workers as their bargaining agent, according to an announcement on July 10 by Russ F. Hall, National Labor Relations Board field examiner. The U.M.W. polled 174 votes; Progressive Mine Workers, 41; and 107 did not designate their preference.

•

## Obituary

Paul Darlington Everly, 39, superintendent of the No. 3 mine of the Pond Creek Pocahontas Co., Bartley, W. Va., died July 20 of a heart attack.

Dr. William H. Berge, 71, president of the Kehoe Berge Coal Co., anthracite operating organization, Pittston, Pa., died suddenly July 14 of a heart attack at his office in Scranton. He also had been prominently identified with the medical profession of northeastern Pennsylvania as a physician

and surgeon for nearly half a century. He entered the coal industry in 1921 and became affiliated with John Kehoe in 1930.

THOMAS HENRY BUTLER, 69, lately general supervisor of mines for the Union Pacific Coal Co., who had been employed in the coal industry during his entire business life, died July 9 in Ogden, Utah, of a heart attack. He had been in retirement for some months. He began working in the mines in the early 80's, later becoming a mine superintendent in southern Wyoming, where he became widely known. He was a life member of the Union Pacific Coal Co.'s Old Timers' Association.

•

## Manor Tipple Destroyed

The tipple and conveyor of the Manor Coal Co., Vindex, Md., was destroyed by fire of undetermined origin late in June, entailing a loss estimated at $100,000. About 260 men were thrown out of work; they had been employed about three days a week.

•

## Tioga Mines to Be Reopened

Mines at Tioga, Nicholas County, W. Va., are to be reopened by the newly organized Tioga Coal Corporation, which has leased the mining equipment and a large acreage near the mines in preparation for mining coal on an extensive scale. Incorporators are Thomas Reese, Harold Davies and J. N. Berthy, Jr., with N. E. Bennett as engineer in charge of the reopening.

## 63 Lives Lost in Explosion In Sonman Mine

An explosion in the Sonman Slope mine of the Koppers Coal Co., Sonman, Pa., shortly before noon on July 15 took a toll of 63 lives. Most of the dead were suffocated; others were burned. Twenty-one men escaped, crawling on hands and knees to safety. Most of the bodies were found in Right Entry 16, where miners said the explosion occurred, though a number also were recovered in Right Entry 17 and Right Entry 18. According to an unverified report, a spark from a coal-cutting machine set off the blast.

One of the survivors said: "It was more of a concussion than an explosion. A great ball of white fire swept down the tunnel. I was knocked down. With others, I scrambled down on my hands and knees." Another said: "I saw a flash and heard a loud noise and rumbling. Then things started to fall all around me. It was difficult to breathe, and we got down on our stomachs for a while. The air was better down there. Finally, we made our way to the dip and were rescued."

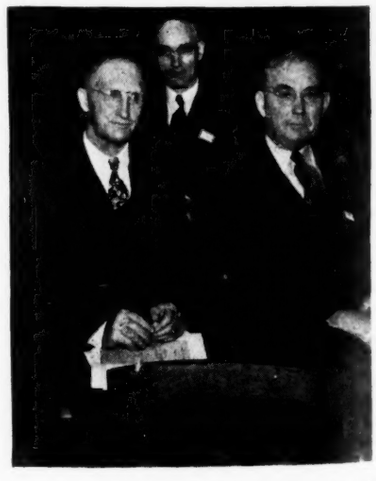
Joseph J. Walsh, Deputy State Secretary of Mines, took charge of an investigation begun July 16 and to be continued on the 18th at Portage, Pa.

The U. S. Bureau of Mines announced on July 16 that it would start an investigation the following day to determine the cause of the disaster.

•

## Correcting the Record

As a result of an error in retouching and make-up, one of the pictures of men attending the meeting of the Indiana Coal Mining Institute was incomplete and wrongly captioned upon appearance in the July, 1940, *Coal Age*, p. 89. Andrew Hyslop, Sr., Snow Hill Coal Corporation, appears in the complete photo reproduced herewith, along with William Cunningham, Linton-Summit Coal Co., and Peb G. Conrad, Knox Consolidated Coal Corporation.



In this illustration of men attending the Indiana Coal Mining Institute meeting, Andrew Hyslop Sr., Snow Hill Coal Corporation, sits behind William Cunningham (left), Linton-Summit Coal Co., and Peb G. Conrad (right), Knox Consolidated Coal Corporation.

### Permissible Plates Issued

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in June, as follows:

Ingersoll-Rand Co.: Type 50, Model 120 air compressor; 35-hp. motor, 500 volts, d.c.; Approval 386A; June 13.

Goodman Manufacturing Co.: Type 512-CC shortwall mining machine; 35-hp. motor, 210 volts, d.c.; Approval 409; June 28.

---

In the article beginning on p. 47, the captions under the two cuts—pp. 47 and 48—should have been reversed.

•

### Ohio State Graduates Students In Mine Management

With the presentation of certificates on July 12 by Prof. Harry E. Nold, chairman of the mine engineering department, 26 students completed their work in Ohio State University's second annual summer institute on mine management. Principal speakers at the closing exercises were President Howard L. Bevis of the university and J. W. Woomer, general manager of mine operations, Warner Collieries Co. Dean Walter C. Weidler of the commerce college was toastmaster.

Lecturers at the sessions were selected from the university's faculties in engineering and commerce, and from the industries. Those enrolled were selected by their companies as men of promise for this study of the coal-mining industry, its problems, and its relation to the general economic field.

Men from the following companies took the course: Hanna Coal Co.—Walter J. Bernosky, Adena, Ohio; James D. Ireland, Wheeling, W. Va.; Michael R. Janc, Neffs, Ohio; Raymon H. Kruzeski, Dillonvale, Ohio; Elsworth E. Loper, Mount Pleasant, Ohio; Rocco Mangieri, Piney Fork, Ohio, and Thomas C. Wheeldin, Jr., St. Clairsville, Ohio. Jefferson Co.—Ralph Erhard Jr., Smithfield, Ohio. Ohio & Pennsylvania Coal Co.—Merle Kugler, Cadiz, Ohio, and Robert V. Rowe, Amsterdam, Ohio. Pittsburgh Coal Co.—William J. Bregar, Smithton, Pa.; Albert H. Furlong, Finleyville, Pa.; S. K. Hissom, Jr., Canonsburg, Pa.; Charles Klink, Jr., Library, Pa., and Edwine Ringer, Burgettstown, Pa. Powhatan Mining Co.—Henry M. Bigler and Harold C. Snow, Powhatan Point, Ohio. United States Coal Co.—Robert Foster, Smithfield, Ohio, and Donald McHugh, Bradley, Ohio. Warner Collieries Co.—Roland E. Featheringham, Bergholz, Ohio; George Adamson Jr. and Paul L. Scott, St. Clairsville, Ohio, and Albert Woodcock, Amsterdam, Ohio. Youghiogheny & Ohio Coal Co.—Stephen C. Futey, Lansing, Ohio, and William H. Williams, Amsterdam, Ohio.

•

### New Troy Tipple Planned

Plans are going forward for the construction of a new three-track steel tipple and storage bins at the Troy mine of the Chicopee Coal Co., Troy, Ill. The new structure

will replace the old one which was destroyed by fire on June 11. Flames consumed the headframe, shaker frame and storage bins, causing a loss, according to John Cullen, president, of more than $20,000.

•

### New Jones Assembly Line

A new transfer assembly line for coal sizes to and from crusher is now being installed at the Rachel mine of the Jones Collieries, Inc., Rachel, W. Va.

•

### New Hirst Tipple Under Way

Construction work began during the second week in July on a new tipple at the Sterling mine of John M. Hirst & Co., Salineville, Ohio. The structure will cost about $30,000 and will contain modern coal-loading facilities.

•

## Industrial Notes

ROLLER-SMITH CO., Bethlehem, Pa., has appointed B. S. Woodman as a special representative. He was formerly associated with the Wagner Electric Corporation as special representative and branch manager in Philadelphia, Pa.

MEDART CO., St. Louis, Mo., has purchased the entire wood pulley stock of the Reeves Pulley Co. as well as good will pertaining thereto. The Reeves company, of Columbus, Ohio, discontinued the manufacture and marketing of wood split pulleys as of July 1.

HERCULES POWDER CO., Wilmington, Del., has appointed J. B. Johnson, formerly director of purchases, as assistant general manager of the explosives department. K. W. Jappe, formerly manager of the company's plant at Port Ewen, N. Y., has been named director of purchases to succeed Mr. Johnson.

BETHLEHEM STEEL CO. has awarded a contract to Koppers Co. to rebuild a battery of old type Koppers coke ovens into a battery of 51 modern Koppers-Becker ovens at Bethlehem's Northampton plant, Bethlehem, Pa. The ovens are to be ready for operation early next year.

CHAIN BELT CO. of Milwaukee has made R. T. Steindorf manager of its Chicago office. G. B. Flanigan has been named New York district manager to succeed W. H. Quinn, who died recently.

METAL & THERMIT CORPORATION, New York City, has appointed Dr. Lincoln T. Work, associate professor of chemical engineering at Columbia University, as director of research.

CUTLER-HAMMER, INC., Milwaukee, Wis., has moved its Pittsburgh office to the Park Building, 355 Fifth Ave.

STANDARD STOKER CORPORATION, New Albany, Ind., has purchased all manufacturing equipment, rights and patents of the Cool-

Flue natural draft stoker from the Cornell Mfg. Corporation, Indianapolis, Ind. The new owner will manufacture the Cool-Flue unit under the name of the "Roto-Grate" stoker.

AIR REDUCTION CO., New York City, has appointed Howard R. Salisbury as manager of its Philadelphia office, vice William W. Barnes, retired. For the last six years, Mr. Salisbury has been assistant manager at Philadelphia. H. B. Seydel, hitherto assistant sales manager of the New York district, has been named assistant manager at Philadelphia.

GOULD STORAGE BATTERY CORPORATION, Depew, N. Y., has appointed John C. Sykora as general sales manager. Joining the company's New York City office in 1919, he was placed in charge of sales and service for the New York branch in 1922, and five years later was made assistant to the general sales manager.

PORTABLE LAMP & EQUIPMENT CO., Pittsburgh, Pa., has made Earl J. Coggeshall mine lamp engineer. Connected for several years with the electrical section of the U. S. Bureau of Mines, he is a lighting authority. H. A. Hill has been appointed mechanical engineer.

•

## Trade Literature

BAR STOCK VALVES — Reading-Pratt & Cady Division, American Chain & Cable Co., Reading, Pa. Booklet contains complete information, dimensions and application recommendations for bronze, carbon steel and stainless steel bar stock valves, precision machined and capable of withstanding a wide range of temperatures and pressures.

BELT FASTENERS — Flexible Steel Lacing Co., Chicago. Bulletin F-100 gives complete details and list prices on Flexco HD belt fasteners and rip plates.

CABLE CONNECTORS—Electroline Co., Chicago. Bulletin F-2 describes improved Electroline-Fiege wire-rope connectors with built-in vibration-damping design. Installation methods are given and the several corrosion-resistant finishes and types, available in various sizes, are listed.

CAR SPOTTERS—Link-Belt Co., Chicago. Folder 1592 cites the advantages in economy, efficiency, convenience and speed in using its car spotters; specifications are included.

COAL WASHING TABLE—Deister Concentrator Co., Fort Wayne, Ind. Bulletin 119 cites outstanding advantages of the Super Duty Diagonal-Deck No. 7 table, describing its construction, operation, capacity and results.

CONNECTORS — Burndy Engineering Co., New York City. Electrical Connector Guide is a series of charts that make it easy to select the proper connector for a given condition. Catalog 41 gives complete engineering data, list prices, shipping weights and dimensional data.

CONVEYOR-ELEVATORS — Stephens-Adamson Mfg. Co., Aurora, Ill. Catalog 140 covers horizontal and vertical closed-circuit Redler units, with complete specifications and dimensions.

DIESEL ENGINES—Caterpillar Tractor Co., Peoria, Ill. Bulletin D-057 cites in text, tables and pictures the salient features of units designed to fill the requirements of a wide variety of power jobs.

DIRECT-CURRENT MOTORS—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin B-6002 shows a large number of installation views of heavy-duty motors in operation and devotes many pages to design features of these machines.

ELECTRICAL EQUIPMENT — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has issued the following: Booklet B-2243, covering entire line of Westinghouse air and compressed air circuit breakers; Descriptive Data 33-700, describing "De-Ion-Grid" Type "O" oil circuit breakers; Descriptive Data 3705, on Type CS squirrel-cage induction motors; Booklet R-925, listing and describing recent additions to the line of Type LV lightning arresters; Descriptive Data 39-400, describing complete line of outdoor apparatus insulators designed to support outdoor disconnect switches, bus structures, etc.

ELECTRODES—Metal & Thermit Corporation, New York City. Booklet gives complete data on physical properties, chemical analysis, qualifications, approvals and recommended procedures for all Murex mild steel welding electrodes as well as briefer information on Murex alloy steel electrodes.

FLEXIBLE COUPLINGS—Link-Belt Co., Chicago. Catalog 1845 gives price and dimensional data on Types A, B and RC couplings together with information on revolving and stationary casing for the RC type.

FLUORESCENT LIGHTING — Benjamin Electric Mfg. Co., Des Plaines, Ill. Bulletin 40 gives data in question-and-answer form on fluorescent lamps and their operation, with complete descriptions, specifications and listing of Benjamin equipment.

GAS MASK—Mine Safety Appliances Co., Pittsburgh, Pa. Bulletin EA-6 describes the All-Service Mask and the new all-vision facepiece featuring non-fogging large-area lenses of laminated shatterproof glass.

HYDRAULIC PRODUCTS — Blackhawk Mfg. Co., Milwaukee, Wis. Catalog 40H illustrates such products (with applications) as hydraulic hand jacks, gage-equipped jacks, wheeled floor jacks, high-pressure valves, remotely controlled jacks (hand-operated and motor-driven), hydraulic tools for maintenance and production, and hydraulic pipe and conduit benders.

MILL MOTORS—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Descriptive Data 4074 shows construction features of Type MC heavy-duty d.c. units, listing standard and special accessories.

MINING LOCOMOTIVES — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Booklet 2210 describes explosion-tested

trolley cable reel mining locomotives and associated equipment, giving design and construction features of all the electrical and mechanical equipment.

MULTI-BREAKER SERVICE AND LOAD CENTERS—Trumbull Electric Mfg. Co., Plainville, Conn. Circular 323 covers five different types of multi-breaker equipment, defining the applications of each particular type.

PANEL INSTRUMENTS — Roller-Smith Co., Bethlehem, Pa. Catalog 4120 illustrates and describes round and square 3- and 4-in. ammeters, voltmeters, wattmeters and milliameters, a.c. and d.c.

PORTABLE ELECTRIC SAWS — Black & Decker Mfg. Co., Towson, Md. Handbook gives history of the saw, explains factors in portable saw design, and gives application photographs, together with comparative figures on hand saw and portable electric saw operation, operating data, specifications and accessories.

RESPIRATOR—H. S. Cover, South Bend, Ind. Booklet details features and construction of various models of Dupor respirators. Folder describes a new miniature model.

SHOVELS, DRAGLINES, CLAMSHELLS—Byers Machine Co., Ravenna, Ohio. Catalogs show new features and greater power embodied in the company's line of units.

SIGNAL SYSTEM—Portable Lamp & Equipmentment Co., Pittsburgh, Pa. Bulletin 2 tells how its new reflector button switch signal device, developed to overcome the expense of complicated systems, can be a positive means of reducing mine haulage accidents.

SWITCHGEAR — Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin shows by listed comparisons the improvements embodied in A-C vertical lift metal-clad switchgear in contrast with old-fashioned types.

WIRE AND CABLE—General Electric Co., Schenectady, N. Y. Bulletin GEA-2733D contains information on the many types of Flamenol synthetic-insulated wire together with a listing of its varied applications. GEA-3361 and 3362 are devoted to how to terminate tellurium parkway, shielded single-conductor cable and braided, shielded single-conductor cable respectively.

•

## Coal-Mine Accident Fatality Rate Registers Slight Change

Accidents at coal mines of the United States caused the deaths of 67 bituminous and 16 anthracite miners in May last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 35,468,000 net tons, the accident death rate among bituminous miners was 1.89 per million tons, compared with 2.06 in the corresponding month of 1939.

The anthracite fatality rate in May was 4.05, based on an output of 3,955,000 tons, against 3.75 in May, 1939.

For the two industries combined, the accident fatality rate in May last was 2.11, compared with 2.43 in the fifth month of the year previous.

Fatalities during May last, by causes and States, as well as comparable rates for the first five months of 1939 and 1940, are as shown below:

UNITED STATES COAL-MINE FATALITIES IN MAY 1940, BY CAUSES AND STATES

| | Underground | | | | | | | | Opencut and Surface | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| State | Falls of Roof | Haulage | Gas or Dust Explosions | Explosives | Electricity | Machinery | Other Causes | Total Underground | Mine Cars | Railway Cars | Other Causes | Total Surface | Grand Total |
| Arkansas | .. | 1 | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | 1 |
| Colorado | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | .. | 1 | 1 |
| Illinois | 2 | 2 | .. | .. | .. | .. | .. | 4 | .. | .. | .. | .. | 4 |
| Indiana | .. | 1 | .. | .. | .. | 1 | .. | 2 | .. | .. | .. | .. | 2 |
| Kansas | 1 | .. | .. | .. | .. | .. | .. | 1 | .. | .. | .. | .. | 1 |
| Kentucky | 9 | 4 | .. | 1 | 1 | .. | .. | 15 | .. | .. | .. | .. | 15 |
| Montana | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 1 | 1 | 1 |
| Ohio | .. | 2 | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | 2 |
| Pennsylvania (bit.) | 5 | 3 | .. | .. | .. | 1 | .. | 9 | .. | .. | .. | .. | 9 |
| Washington | .. | .. | 1 | .. | .. | .. | .. | 1 | .. | .. | .. | .. | 1 |
| West Virginia | 19 | 5 | .. | 2 | .. | 1 | 1 | 28 | .. | .. | .. | .. | 28 |
| Wyoming | 1 | 1 | .. | .. | .. | .. | .. | 2 | .. | .. | .. | .. | 2 |
| Total (bituminous) | 37 | 19 | 1 | 3 | 1 | 3 | 1 | 65 | .... | 1 | 1 | 2 | 67 |
| Pennsylvania (anthracite) | 12 | .. | 1 | .. | 1 | 1 | .. | 15 | 1 | .. | .. | 1 | 16 |
| Grand total | 49 | 19 | 2 | 3 | 2 | 4 | 1 | 80 | 1 | 1 | 1 | 3 | 83 |

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

January–May, 1939 and 1940

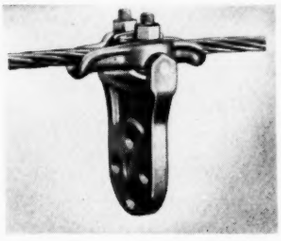
| | Bituminous | | | | Anthracite | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number Killed | | Killed per Million Tons | | Number Killed | | Killed per Million Tons | | Number Killed | | Killed per Million Tons | |
| Cause | 1939 | 1940 | 1939 | 1940 | 1939 | 1940 | 1939 | 1940 | 1939 | 1940 | 1939 | 1940 |
| Underground: | | | | | | | | | | | | |
| Falls of roof and coal | 166 | 209 | 1.249 | 1.114 | 60 | 46 | 2.604 | 2.229 | 226 | 255 | 1.450 | 1.224 |
| Haulage | 51 | 81 | .384 | .432 | 8 | 18 | .347 | .872 | 59 | 99 | .378 | .475 |
| Gas or dust explosions: | | | | | | | | | | | | |
| Local | 3 | 6 | .023 | .032 | .... | 2 | ..... | .097 | 3 | 8 | .019 | .038 |
| Major | ... | 163 | ..... | .868 | ... | ... | ..... | ..... | .... | 163 | ..... | .783 |
| Explosives | 5 | 12 | .038 | .064 | 10 | 3 | .434 | .145 | 15 | 15 | .096 | .072 |
| Electricity | 16 | 7 | .120 | .037 | 1 | 4 | .043 | .194 | 17 | 11 | .109 | .053 |
| Machinery | 8 | 14 | .060 | .074 | .... | 1 | ..... | .048 | 8 | 15 | .051 | .072 |
| Shaft | 3 | 1 | .023 | .005 | 4 | 1 | .174 | .048 | 7 | 2 | .045 | .010 |
| Miscellaneous | 4 | 11 | .030 | .059 | 7 | 2 | .304 | .097 | 11 | 13 | .071 | .062 |
| Stripping or opencut | 3 | 5 | .023 | .027 | 2 | 2 | .087 | .097 | 5 | 7 | .032 | .033 |
| Surface | 9 | 16 | .067 | .085 | 9 | 4 | .391 | .194 | 18 | 20 | .116 | .096 |
| Grand total | 268 | 525 | 2.017 | 2.797 | 101 | 83 | 4.384 | 4.021 | 369 | 608 | 2.367 | 2.918 |

* All figures subject to revision.

# WHAT'S NEW IN COAL-MINING EQUIPMENT

### GROUND WIRE BRACKET FOR STEEL TOWERS

To provide a suitable ground wire bracket for mounting on steel structures the Ohio Brass Co., Mansfield, Ohio, has developed a device with a flat supporting piece, drilled with four



holes to allow bolting to a steel tower, fabricated steel pole or bayonet extension. Using a clamp mounted on top of the device, this bracket, known as the Clamptop, is said to permit an increase of spacing between ground wire and conductor of 6 in. or more over any other designs, assuming the same bolt holes are used.

The bracket proper has two pintles on which the clamp body rests. Two carriage bolts hold the clamp to the bracket and secure the keeper piece over the ground wire. Since the clamp pivots 15 deg. above or below the neutral position, ample clearance for rocking action is provided. The flexibility, similar to that afforded by a suspension clamp, tends to prevent damage to the ground wire at the point of attachment. The clamp seat is so designed that pressure is graded from a maximum at the keeper piece center to a minimum at the ends.

•

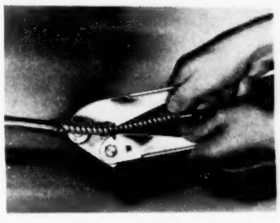
### LUBRICATION GUARD

Recently perfected by Stewart-Warner Corporation, Chicago, to prevent overlubrication of ball and roller bearings, Alemite Lubriguards, a new line of fittings and bushings for industrial machinery, are so constructed that they signal the operator when a bearing is sufficiently lubricated, according to the manufacturer. This fitting is installed directly in the bearing. In operation, with an Alemite hydraulic-type pressure gun applied to the Lubriguard fitting, the lubricant is forced through an inlet of the fitting, and thence into the anti-friction bearing. When a predetermined amount of back pressure is developed in the bearing, excess lubricant appears at the vent, a signal to the operator that further lubrication is inadvisable.

•

### ARMOR CUTTER

No more nicked wires, no bending of cable, no fussing, no shorts and no wasted BX are advantages claimed for a new BX armor cutter announced by Ideal Commutator Dresser Co., Sycamore, Ill. The jaws are



formed to take BX cable of any make—two- or three-wire No. 12 or No. 14—it being only necessary to open the jaws wide, insert the cable and snip; no adjustments are necessary. Weight complete is 12 oz.

•

### WHITEPRINT MACHINE

Ozalid Corporation, New York, announces a high-speed automatic whiteprint machine with many new features, built to provide positive-type prints, developed dry at speeds ranging up to 20 linear feet per minute. Uniform exposure, so essential to perfect printing, is assured by the use of a single high-pressure mercury-vapor tube.

Perhaps the outstanding feature of this machine is the automatic separation of the original and the print. Either cut sheets or continuous yardage can be handled automatically. A speed control and a speed indicator for the full speed range of the machine are located in front of the unit. A variable transformer is included in the primary circuit of the transformer, permitting variations of intensity of the lamp from full brilliancy to 60 per cent of maximum without loss of energy.

•

### SPRAY PAINTING

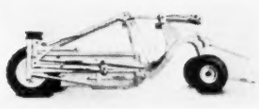
A new series of small spray painting outfits, known as the NCB, is announced by the DeVilbiss Co., Toledo, Ohio. The line consists of five different spray-equipment assemblies built around a ¼-hp. electric-motor-driven air-compressing unit. Three are cup-gun outfits and

two have a pressure-feed paint tank of 2 gal. capacity. The air-compressing unit is said to be novel both in design and construction. It is composed of a ball-bearing piston-type compressor direct-connected to a standard ¼-hp. motor. These together with the air strainer, crankcase and pulsation chamber form an integral unit inclosed in a streamlined housing.

•

### SCRAPER; ROOTER

R. G. LeTourneau, Inc., Peoria, Ill., has designed a new double-bucket cable-controlled



Carryall scraper—the SU—rated at 14 cu.yd. struck capacity and 18 cu.yd. heaped. To minimize loading effort and make greater yardage possible, the scraper blade is narrowed to 8 ft. 6 in. and a patented double bucket bowl used. The narrow cutting edge and two telescoping buckets give the effect of loading successively two small scrapers with a large tractor.

After loading the first bucket to capacity it is drawn back while the second is being loaded. This double-bucket-loading method is designed to eliminate costly voids in the rear of the bowl and at the top of the tailgate. Positive ejector tailgate is said to completely remove contents from bowl bottom and sides even when operating in wet and sticky material under adverse working conditions.

The largest single-bucket Carryall scraper—the Model N—is rated at 25.9 cu.yd. struck capacity and 33 heaped. Constructed with higher sides and a larger apron to hold all of the dirt that the power of two tractors can dig, the Model N is designed for pusher loading. A longer and steeper cutting-blade base, facilitating easy and fast loading, causes material to boil in—to flow back into the bowl and forward into the apron. Cable-controlled fractional-inch cutting, positive ejection and measured spreading are attained through the instant response of the power control unit.

To speed Carryall scraper production, eliminate blasting and extend scraper efficiency into rock, shale and hardpan, the company offers the 9,150-lb. ex-

tra-heavy-duty K3 Rooter. This unit is equipped with three teeth having a maximum depth

of 23 in., each removable to meet job conditions and ideal fragmentation. The center tooth is set ahead of the others to gain quicker penetration in the hardest material.

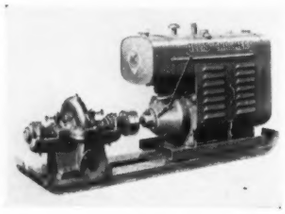
In order to give easier penetration and keep the rooter teeth feeding into the material, the ends of the Rooter shanks are built at a steeper angle than formerly employed on rippers. Hard-faced self-sharpening teeth for natural digging suction fit like caps on the end of the shanks and are reputed to give long life and fast, easy rooting. A bumper frame, mounted on the rear, gives the added advantage of the use of a pusher tractor in tough material and increases the weight of the unit for effective digging. It is built in simple T construction and is completely arc-welded.

•

### CENTRIFUGAL PUMPS

### CRAWLER TRACTOR

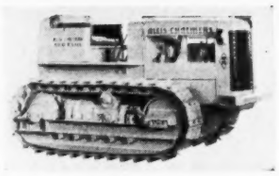
To provide independently powered pumps for drainage, irrigation, gravel and coal-washing plants, coal strip pits, construction jobs and similar applications, the Allis-Chalmers Mfg. Co., Milwaukee, Wis., has introduced a line of centrifugal



pumps driven by gasoline power units. Power units in five sizes (18 to 110 hp.), says the manufacturer, assure economy in operation with a choice of fuels: gasoline, kerosene, distillate, natural gas or butane. All power units have valve-in-head medium-speed engines with removable cylinder liners, efficient cooling systems, force feed lubrication and a variable-speed governor.

The centrifugal pumps are horizontal-shaft single-stage single- or double-suction units designed for handling liquids at normal temperatures with maximum efficiency. To facilitate handling, the engines and pumps are mounted on a base and are available in many combinations to meet various requirements in quantity and pressure up to 5,000 gal. per minute and 100-ft. head.

A new diesel crawler tractor — the HD-10—also is offered by Allis-Chalmers as a companion model to the HD-14. Combining the smoothness and power of the



General Motors two-cycle diesel engine with the cost-saving advantages of Velvetouch bimetallic steering clutches and brakes, and "Positive-Seal" truck wheels, this tractor is designed to cut operating costs to a minimum. The machine is built complete with extra heavy crankcase, radiator, and truck wheel guards, muffler, hour meter, adjustable radiator shutters, bumper, front pull hook, and electric starting and lighting as standard equipment. The HD-10 is designed to handle two- and four-wheel scrapers up to 10-yd. capacity, 12-ft. blade graders, bulldozers, trail-builders, winches, logging arches, and other allied equipment.

•

### DIESEL ELECTRIC SETS

To meet a demand for larger self-contained diesel electric sets, Caterpillar Tractor Co., Peoria, Ill., has added a 66-kw. and a 52-kw. unit to its line. The two new sets, the 11-66 and the 13-52, are completely self-contained and require no gadgets other than a circuit breaker. Both are powered by six-cylinder heavy-duty diesel engines and both require a minimum of maintenance and adjustments. As with the smaller sets, they can be set up and running within an hour after delivery.

•

### REVERSIBLE WRENCHES

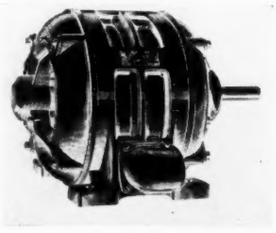
Two new reversible pneumatic wrenches—Nos. 365-R and 375-R —are offered by the Chicago

Pneumatic Tool Co., New York City. Employing a slow-speed rotary motor simple in design, efficient in operation, economical in maintenance, having no gears or resilient member in the driving unit, and being light in weight and of short over-all length, these units are extremely easy to handle. They are said to be particularly useful for removing and applying staybolt caps, dome nuts, cylinder and valve chamber head nuts, front-end nuts, washout plugs, and in structural steel work.

•

### ELECTRIC MOTOR

A new "LO-AMP" electric motor is announced by the Louis Allis Co., Milwaukee, Wis. It has low locked rotor current, and can be supplied with either high starting torque or normal



starting torque. It has all of the rugged simplicity of a standard squirrel-cage motor. It does not have any centrifugal switches, relays, brushes or slip rings, nor does it require any expensive special control to operate—such as multi-step starters.

•

### BELT FASTENER

For joining thin, light-weight conveyor belts, Flexible Steel Lacing Co., Chicago, has added a new size to its line of Flexco HD belt fasteners. Known as the No. 1¼, the new size is used for joining elevator and conveyor belts from $\frac{5}{16}$ to $\frac{1}{2}$ in. thick. The holding bolts are large size, yet, because of its short length, the new fastener will travel around pulleys as small as 14 in. in diameter.

Metal plates span the joint on opposite sides of the belt and are drawn tightly together by two bolts through the belting. Bolt heads and nuts are countersunk and the protruding bolts are broken off; the fasteners are flat and smooth on both sides. The templet locates the bolt holes slightly farther apart than the bolt centers of the fasteners; when the bolts are inserted and drawn down into position the belt ends are forced together tightly, forming a compression seal that will not let material

sift through. The completed joint, since it is a series of separate fastenings, can assume the trough of the conveyor as naturally as the rest of the belt.

•

### ONE-MAN WELL DRILL

A new compact "Clipper" drill, the K-2, has been announced by the Loomis Machine Co., Tiffin, Ohio. Built for one-man operation, it is said to be rugged, tested, modern, light, simple and economical. Special features are: all-steel electric welded frame; chain driven bull reel (capacity of 900 ft. of ½-in. wire line without divider) with take-up for wear, having independent brake control and independent clutch; large crown pulleys on oil-less bearings; strong adjustable chains; sturdy, guyed, all-steel mast 27 ft. from bottom to center of crown pulley and is raised by hand in four minutes; reels of large capacity; suitable for all-weather operation; and powered by a removable 16-hp. four-cylinder air-cooled gasoline engine, controlled by a lever at the driller's side. The net weight, less tools and cables, is 3,980 lb. It may be mounted on a truck, reducing moving time.

•

### PILLOW BLOCK

To meet demand for one-piece housing pillow blocks for shafts of $1\frac{7}{16}$- to $1\frac{15}{16}$-in. diameters, Randall Graphite Products Corporation, Chicago, has developed a new, larger unit of this type. Features claimed for it include: quiet operation, selective mounting positions, constant self-alignment, self-lubrication, and one-third less weight. The entire assembly, consisting of only three parts—the one-piece steel housing, a new machined cast-iron ball with large oil reservoir, and a patented bronze bushing with graphite-filled grooves to provide ample lubrication—is attractively cadmium-plated to resist corrosion and is assembled ready for use.